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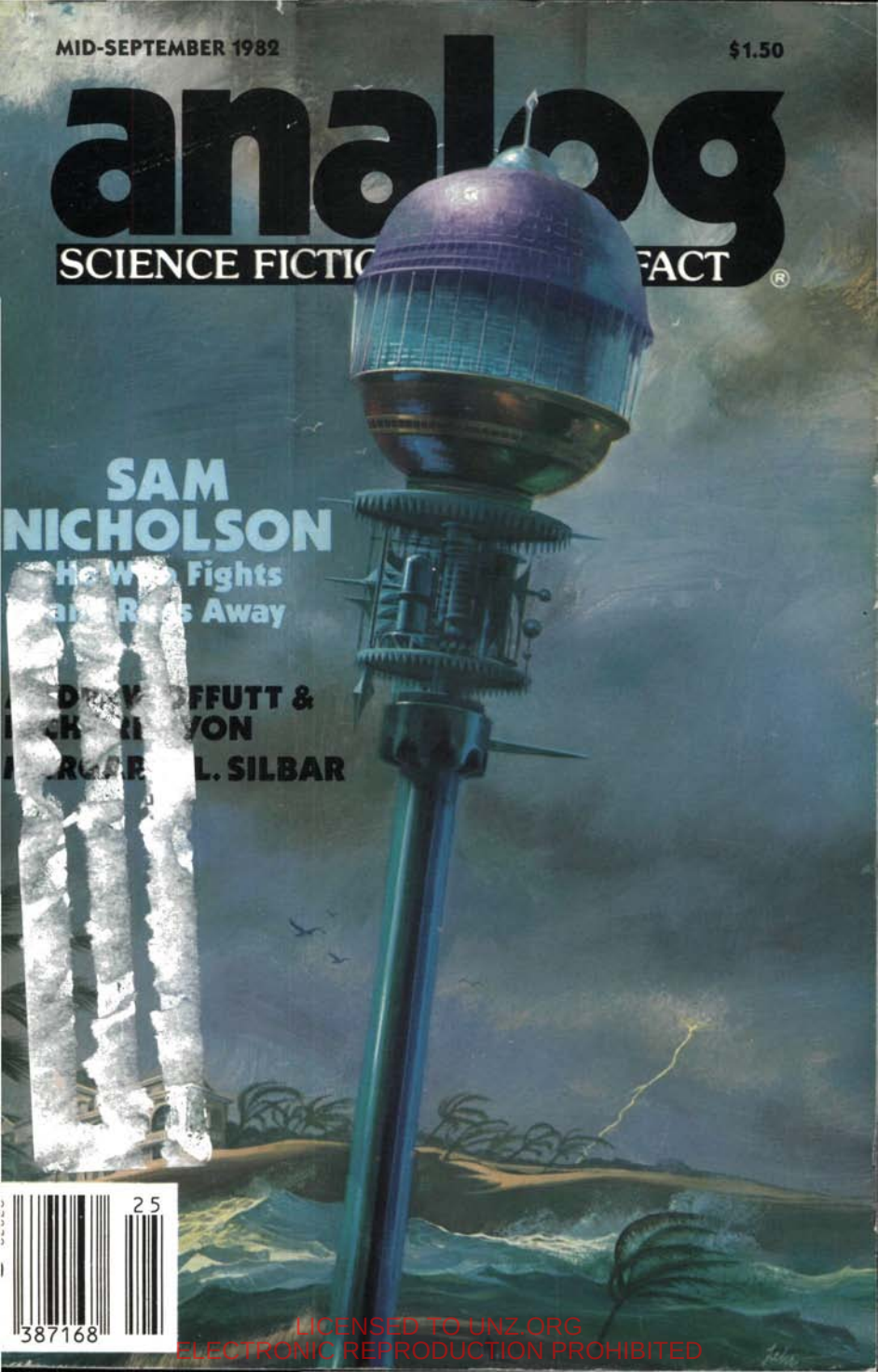

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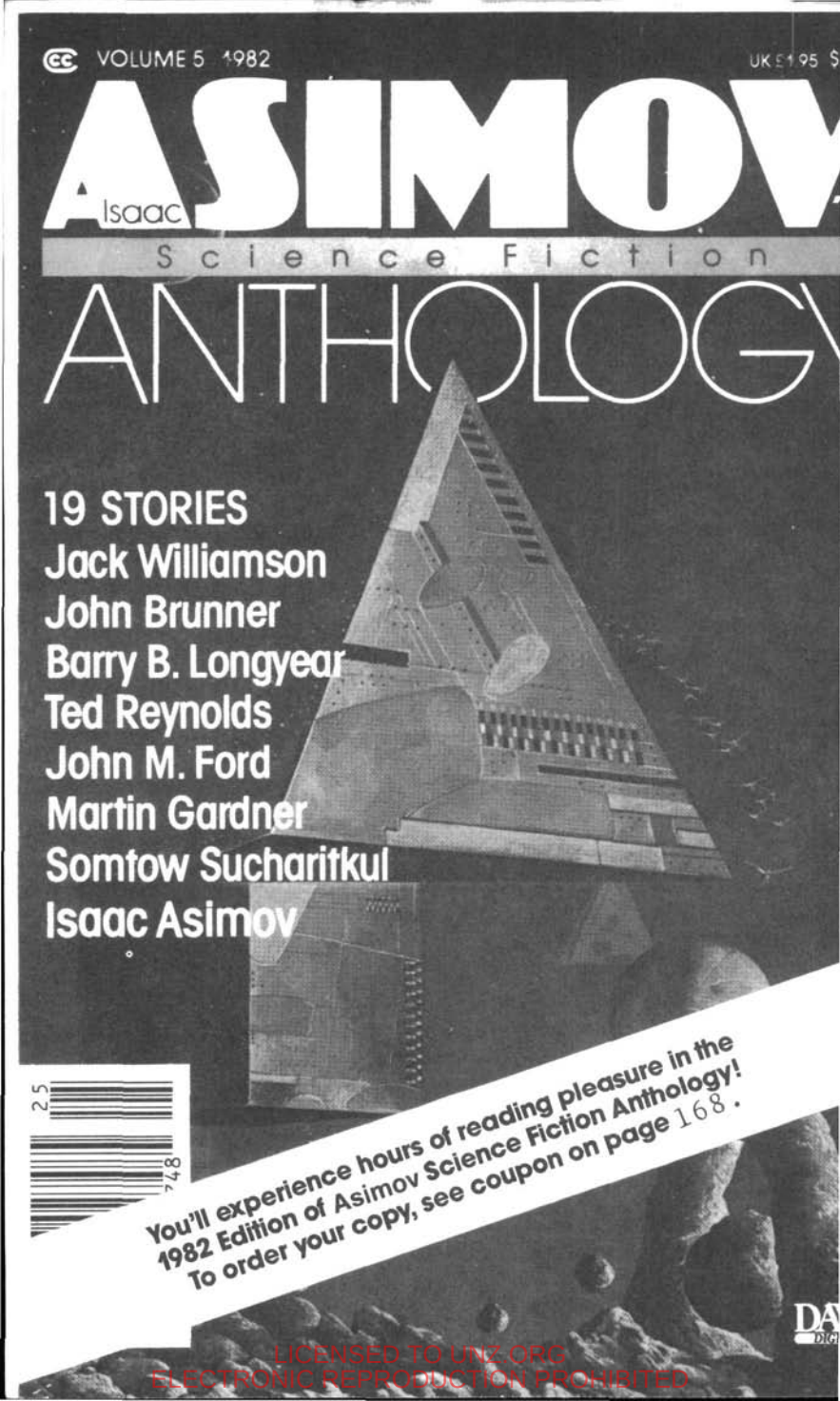

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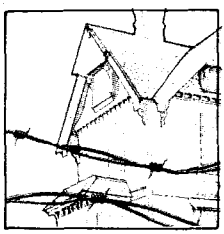

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Editorial

MORAL ENGINEERING

by Stanley Schmidt

A few issues back, my editorial here was titled "The 'Moral' 'Majority.' " Its subject was the morality of dictating other people's morality—a habit currently enjoying a new vogue. Not surprisingly, I got plenty of mail on the subject, some of which has appeared or will appear in "Brass Tacks." I'm sorry I couldn't print or directly answer *all* the letters, but I'd like to start toward this month's main topic by responding to a few of the more interesting points which turned up in the mail.

As usual, quite a few "rebuttals" were not actually rebuttals (of anything I said), but attacks on things which I did not and would not say but which the "rebutter" chose to read into my words. A fairly typical example goes on for six lucid, thought-provoking pages, marred only by the fact that the points the writer "replies" to bear little resemblance to what I actually said. It's too bad he didn't read as well as he wrote. As I've said before, it does little good for a writer to say exactly what he means unless the reader takes equal pains to read exactly what he wrote.

A few misconceptions and misinterpretations were common enough that I'd better try to lay them to rest before I do anything else. First, the organization called "The Moral Majority" was *not* the principal subject of the earlier editorial; it was merely an illustration and a starting point for a more general discussion. Nevertheless, on the advice of a reader who is also a member, I wrote for that group's own literature on its positions and goals. It finally came, after a wait so long I nearly gave up; unfortunately, it did not alter my views. The Moral Majority's own pamphlets confirmed my suspicion that it (like any group with the same approach) poses an insidious but serious threat to freedom. Insidious, because it states its aims in words which sound seductively noble to an uncritical reader. "We are not a censorship organization," proclaims one pamphlet. "We believe in freedom of speech, freedom of the press, and freedom of religion." Sounds great, but the record says they *have* tried—with some success—to censor television. The fact that they were smart enough not to try to do it by legislation is immaterial; the effect is the same. There is a great deal of difference between a populace voluntarily withdrawing its support for a sponsor of something it dislikes, and a pressure group making threatening noises to a sponsor who obligingly knuckles under.

Common misconception number two was that "The 'Moral' 'Majority' "

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was an attack on religion. It emphatically was not. Religion was hardly even mentioned; a couple of religious groups were, but that's a different matter entirely, and those groups were not even depicted as representative of *all* religious groups. Religion *per se* has little or nothing to do with what I was talking about. Religion and morality are two separate issues; they are closely linked for some people, but they don't have to be. I've seen little correlation between religion and moral character among people of my acquaintance. The people I most like and respect range from clergymen to atheists; so do those I *least* like and respect.

Misconception number three can be variously stated: that I advocate "nonmoral government," that "morality is a matter of taste," or that I recognize no moral principles which should apply to governments. This one, frankly, astounds me. I explicitly warned against it, and I spelled out a moral principle that I *did* think could be legitimately imposed on both governments and individuals: that "anyone should be free to do anything he wants unless it hurts someone else." Interference with other people's actions is justified only when their actions violate this requirement—but it is justified then.

Look, friends—that *is* a basic moral principle, and a pretty stringent one at that. Yes, it accepts as moral—or at least "not immoral"—a lot of actions which many cultures (including ours) have condemned and punished. It also rejects as immoral a lot of things which have been done in the name of "morality." Neither of those facts changes its basic character. It is a comprehensive moral principle, though not one which has ever yet been widely adopted. Maybe *Homo sapiens* is not yet capable of living by a code based on this precept; but in principle such a code can be built, and I suspect that, at least under some conditions, it could lead to a better way of life than any history has yet produced.

Like any fundamental moral principle, this one must be accepted without proof—but that does not mean without support. The fundamental postulates of mathematics and science must also be accepted without proof—but that does not mean that all conceivable postulates are equally valid. "Pi = 3," for example, cannot be made part of a logically consistent description of geometry in a Euclidean space. A correctly descriptive astronomy *can* be formulated using Ptolemaic epicycles—but the required formulation of the rest of science to go with it is so cumbersome it isn't worth the trouble. A Copernican-Newtonian system gives a description just as consistent, and a lot easier to work with. My proposed moral postulate was chosen for similar reasons: of the possibilities I knew of and could accept, this one seemed easiest to fit into a system free of contradictions and simple enough for practical use. Several letter writers were willing to accept other justifications for dictating other people's actions, with such defenses as, "We cannot condemn a group because it wants to make government moral—we must instead judge the moral system it advocates." But nobody offered a clear criterion for doing that, and one reader

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put a perceptive finger on the dangers of trying to do it without such criteria: "We have neither the discipline nor the compassion, as a people, to wield responsibility of that sort with fairness." My proposal recognizes that as a fundamental problem and therefore limits mutual value judgment to a necessary minimum. It leaves people free to try to build optimum life systems by whatever criteria they perceive as having the best chance of working for them—with the single universal (and large) restriction that they must avoid interfering with other people's efforts to do the same. It makes no attempt to guarantee every individual or every group the best possible life, but only the right to strive for it. Each has the option of messing up his own life—but not anybody else's.

Already I can hear the objections to the comparisons between science and ethics in the previous paragraph; I've heard them before. (And now I'm getting close to the destination heralded by my title.) Two of the more interesting comments I got on my last foray into ethics ran something like this: (1) It's a mistake to try to have faith taught as science, but it's also a mistake to try to make a science of things of faith. (2) Most actions have multiple effects, many unintended, some good and some bad; and therefore few real actions would be clear moral choices under my proposed principle.

Right!—anyway, on point (2).

One reader claimed that my "basic principle" ignored the question of "How do you decide which injuries are most undesirable?" and therefore led to "moral paralysis." I can assure him from experience that it does not—any more than the need to weigh costs and risks against benefits produces "engineering paralysis." A man designing a car must consider the effects of a proposed design feature on reliability, comfort, fuel economy, safety, pollution, sales appeal, and a host of other variables; usually some of those effects will be beneficial and others adverse. This doesn't mean he despairs of ever building a car and runs off to live in a cave; if he's any good at his job, he estimates all those effects—*quantitatively*, whenever possible—puts them together to compute an overall estimate of the feature's desirability, and then either does it or continues the process to decide on a better alternative. A moral decision is not nearly as different as people like to think it is. If a person has to choose among several courses of action, each having some harmful and some beneficial effects on different individuals or groups, he has to assign some sort of value to each of those effects, derive some "composite value" for each possible course, and pick the one that looks best.

We all do that anyway, even if the process is more intuitive than conscious and even if we sometimes uncritically accept "textbook" values for variables that we should evaluate ourselves. Maybe instead of pretending the similarities between moral and scientific or engineering decisions don't exist, we should be learning to understand and use them. Maybe we *should* be trying to make a science of ethics—or at least a practical system of "moral engineering."

It's perfectly true that there are few

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"clear"—i.e., absolute, single-valued, unequivocal—moral decisions in the real world. It's equally true that there are few absolute, single-valued, unequivocal engineering decisions. But engineers have to make decisions, so they've evolved a whole set of techniques for making them more or less rationally. Since we all have to make moral decisions, maybe it's about time moralists started working on something analogous, rather than wasting time arguing about Absolutes and Universals that really aren't.

I'm not advocating a "strictly mathematical" approach to morality—though I find nothing intrinsically disturbing in the possibility that such a thing could be formulated. If it gives right answers often enough (whatever that means!) what's so terrible about its being couched in mathematical terms? If it *doesn't* give right answers often enough it should be rejected—for being *wrong*, not for being mathematical. In the areas that have so far proved amenable to precise mathematical description, the mathematical descriptions have tended to be more productive than vague verbal ones. Are you *sure* that ethics are categorically ineligible for such an approach?

The idea is not utterly new to science fiction readers. As far back as 1945, Will F. Jenkins (as Murray Leinster) hinted at something like it in "The Ethical Equations." Harry Harrison approached it from another (and particularly interesting) angle in 1963, in *The Ethical Engineer*. One of his characters pointed out that a "law" of gravity stating that things fall with acceleration 9.8 m/sec^2 is no law, but merely a local observation valid only at the surface of this planet. The *law* of which it is a special case is $g = GM/r^2$, which can be used to calculate the gravitational acceleration anywhere in the universe by *plugging in local values of variables and adding up the effects of all bodies which produce any*. The laws and customs of any human culture are at best an analog of $g = 9.8$ m/sec^2—applicable only under a special, local set of conditions. They may well be a special case of some more general laws, applicable, say, over all human occupied space. But those more general laws will be more like $g = GM/r^2$, with *variables* which will yield different codes of behavior when different local values are inserted. Rules for the use of water, for example, are quite different on a remote mountain stream, in New York City, in the Sahara Desert, and aboard a space shuttle.

It's even conceivable that ethical principles might be formulated in such a general way that they could be applied to *any* intelligent beings. "Metalaw," a concept discussed in a couple of fairly recent articles in these pages, is essentially an attempt to do that. A "mathematical" formulation, if one is possible, might describe fixed relationships among many variables describing environmental conditions and the anatomical, physiological, and psychological characteristics of beings; putting in specific values would reduce the general equations to an optimum behavioral code for any combination of interacting beings and circumstances. (Yes, I know that the psychological variables depend on past cultural conditioning; that just means that part of solving the problem is put-

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ting in their values at a specified time and place. Scientists who work with differential equations deal with something similar all the time: things called "initial conditions" and "boundary conditions.") The whole concept may sound far-fetched, and at the very least it's a *very* ambitious project. But if you're determined enough, it may well be possible to develop a set of generalized parameters which can describe virtually any being or culture. Many humans will shrug the possibility off, or grant that maybe it *could* be done but feel quite sure that it *shouldn't*. But what if we suddenly find ourselves in contact with some galactic federation which *has done it?*

A physical theory can usually be formulated in many different-looking but equivalent ways, depending on which set of variables you choose to regard as fundamental. The same may be true of moral theories. It seems to me that the principle I proposed last time might be at least a rough approximation to a usable basic postulate of a "universal" system of moral engineering. As such, it might better be stated: "Hurting other beings is wrong."

If you accept that—without proof, as basic postulates are always accepted—ramifications begin to follow at once. One of the first and most important is that there *are* few "clear and absolute" choices. This does *not* mean that all choices are equally valid, but only that few choices will be clearly right in all possible respects. Most actions *will* have both beneficial and harmful consequences; sometimes it is impossible to avoid hurting somebody in the proc-

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ess of achieving some greater good. There seems no way around that, so accept it and live with it. A first step might be a "minimal moral imperative" which states: "Thou shalt act so as to minimize harm caused to others by thy actions." (You can harm yourself, if you insist; the principle provides no justification for anyone else to interfere with that. It does recognize that hurting *others* is grounds for interference. *Who* is entitled to interfere is a considerably thornier question which I deliberately avoided last time, despite the claim of one reader that, "Dr. Schmidt apparently thinks it self-evident that, when A is hurting B, third parties have an objectively identifiable and logically defensible interest in stopping A." He brought up third parties; I didn't. They raise a whole new set of nasty questions. In his example, B's justification for interfering with A seems clear, but any third party's is far less so. If you can't see why, maybe you should read Katherine MacLean's story, "Unhuman Sacrifice," *Analog,* November 1958.)

I don't claim to have worked this into a quantitative theory that covers all bases. I can conceive of the possibility, at least in principle, that it could be done. Admittedly, even so, it is very limited—somewhat as Newtonian physics is less general than Einsteinian, or a set of equations for projectile motion with no air resistance terms is useful only when air resistance effects are small. Perhaps the most serious shortcoming of this "minimal moral" principle is that it is just that: minimal. It tells you what you *mustn't* do, and what you can stop others from doing, but it offers no suggestions as to what you *should* do. It defines vice but not virtue, and a culture in which nobody has any desire to do "good" things would be a pretty dismal place to live.

If there is a mathematical function for the "overall value" of an action, it might well be a sum of terms expressing

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harmful and "desirable" effects. A harmful effect would go in as a negative term, of magnitude determined by its severity, and the mathematical statement of "minimal morality" might say, "Whenever possible, avoid a negative total." No one can *require* you to do more—that is, to be good (positive total) rather than merely "unbad"—but people (including yourself) will tend to appreciate it if you do. Many people would agree that "positive" terms in the equation would represent effects which benefit you or others or both, and that it is desirable to go beyond avoiding a negative "total value" and strive to make the value as strongly positive as possible. We then have a continuous spectrum of moral values, incorporating virtue as well as vice, with grades of each—and with most real actions involving some of both (which is about as close as I can get to the idea of "universal sin").

The essence of the system, in practice, boils down to two guidelines:

(1) You and I *must* avoid negative totals, to the extent that we can; and if we don't, we must expect intervention from others (at least our victims, and possibly others) to see that we do.

(2) We are advised, but not required, to strive for positive totals.

A necessary corollary is that in applying these principles, we must always heed the lesson of "Unhuman Sacrifice": if my actions affect you, I must try to understand you well enough to *know* which terms are positive and which negative — by your lights, not mine.

Yes, it's crude. So were descriptions of motion a thousand years ago—but a few centuries of thought and work and experiment have refined them first into classical physics and now into relativistic quantum mechanics. (Further studies are in progress.) Real-life moral decisions are a lot more like engineering decisions than people commonly suppose. If we start there and give ethics a few centuries of work comparable to that which has gone into physical science, where might we be at the end of that time? Might today's judges evolve into "moral engineers," able to sort out difficult cases with a real understanding of issues now only vaguely felt? More importantly, might ordinary education instill enough understanding of "basic ethical science" in everyone that only rare cases would need the attention of specialists?

If there's even the slightest chance that that kind of thinking might lead eventually to a universe of predominantly happier beings, might it not be worth a try? ■

● The most beautiful thing we can experience is the mysterious. He to whom this emotion is a stranger, who can no longer wonder and stand rapt in awe, is as good as dead: his eyes are closed.

Albert Einstein

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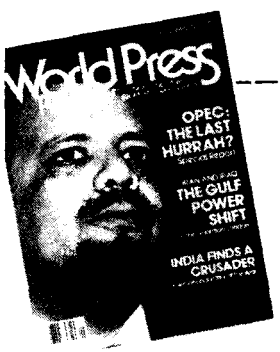

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THE LUSTS OF PROFESSOR ADAMS

L. Sprague de Camp

The recent death of Prof. Twerping Adams, at the sanitarium at Wappingers Falls, N.Y., where he had resided for several years, recalls his association with the expedition sent by the Drinkwhiskey Institute to the Siwalik Pleistocene in 1932.

Sensational stories have appeared in the tabloid press from time to time, telling of Professor Adams's alleged psychosis: that he had acquired a fixation from his name and, thinking he was the biblical Adam, insisted on rushing about the street of New York naked, crying that he was looking for the Tree of the Knowledge of Good and Evil. In fairness to the memory of my unfortunate colleague, I feel that I should set the record straight.

Twerping Adams was not very popular with the other members of the Drinkwhiskey expedition, because of his mercurial and self-contradictory character: by turns benign and irascible, generous and grasping, rash and cowardly, sanctimonious and lewd—in fact, about every pair of character antonyms you can conceive.

Shortly after our arrival in the Siwalik Pleistocene, we made contact with the astral body of the Yogin of Swettypore, who had preceded us. The Yogin had originally intended to send back the astral bodies of the entire expedition in this manner, but had become greatly upset when his own A.B. (as we came to call this entity) refused to return to the present, and instead sent back a message that he had fallen in love with a Java woman. The Yogin refused to have anything more to do with us, and we were forced to create our own chronomobile.

A.B., we found, was inhabiting the body of a burly male *Pithecanthropus* and was quite willing to satisfy our curiosity about life among the ape-men. Professor Adams, an anthropologist, spent many hours interviewing him. Because of his jaw structure, A.B. had difficulty with articulate speech. Adams circumvented this obstacle by teaching A.B. the American Indian sign language. A.B.'s mate, the Java woman who had caused his dereliction, made a tentative effort to learn English. Unfortunately she mastered only three words, all unprintable.

A.B.'s fellow clansmen regarded the expedition with suspicious reserve. The suspicion became pronounced when several of the younger females took to following Adams around and grooming his scalp while he conversed with A.B.

The day before we were due to leave, it was discovered that the bottles of liquor

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that had been brought along for medicinal purposes were missing. Adams, known as a vehement prohibitionist, was not suspected. But that night he failed to return to camp. Our leader refused to allow a search party to set out through a jungle infested with venomous snakes and formidable carnivora at night.

Just before dawn, we were about to begin our search, when Twerping Adams rushed out of the jungle, dived into the chronomobile, and shouted to us to follow suit. The appearance of a large body of ape-men armed with clubs and stones led us to obey his recommendation.

The pithecanthropi bombarded and pounded our vehicle for an hour. Being unable to make any impression on it, they withdrew. Professor Adams, we observed meanwhile, had a black eye and an extremely strong breath.

Shortly thereafter, A.B. arrived and gave Adams a terrific scolding in sign language. Adams's defense, as nearly as I could follow the gestures, was: if a so-called spiritual being like you can take mates from among the Java people, why cannot I?

A.B. brushed this objection aside, insisting that the cases were not parallel. He cited the story of the famous Yogin, Shakara, who, ridiculed for his ignorance of earthly love, undertook to repair this condition. This he did by leaving his body in charge of his pupils, while his spirit took possession of the just-dead King Amraka, restored it to life, and returned it to the arms of Amraka's queen, where it dwelt for a space before Shankara abandoned it and returned to his pupils. Later this piece of research, on which the Yogin wrote a scholarly treatise, was held not to have affected Shankara's standing as a holy ascetic, despite the uncompromising hostility of Yoga to earthly love.

Matters were finally compromised by allowing A.B. to inflict a public and literal spanking to Twerping Adams, and we left the Pleistocene with our specimens and records forthwith.

After our return to this era, we began to observe increasing signs of distress and depression on the part of Professor Adams. He was finally prevailed upon to confide his troubles to his colleagues.

He had become convinced, it transpired, that his association with the Java people had resulted in a race of hybrids or mongrels, and that the sorting out of the human genes in this race had led to the emergence of *Homo sapiens* a few million years before this catastrophic event might have come about. Thus he was in a literal sense the ancestor of all mankind, a true "Adam."

His mental breakdown, however, had nothing to do with the coincidence of his name, but was the result of his brooding on the history of this human race, for which he believed himself responsible. He based his theory on the assertion that everybody he looked at showed a strong family resemblance to Twerping Adams.

The most curious feature of the whole affair, as I and my colleagues have long since agreed in private conversations, is that *they do*. ■

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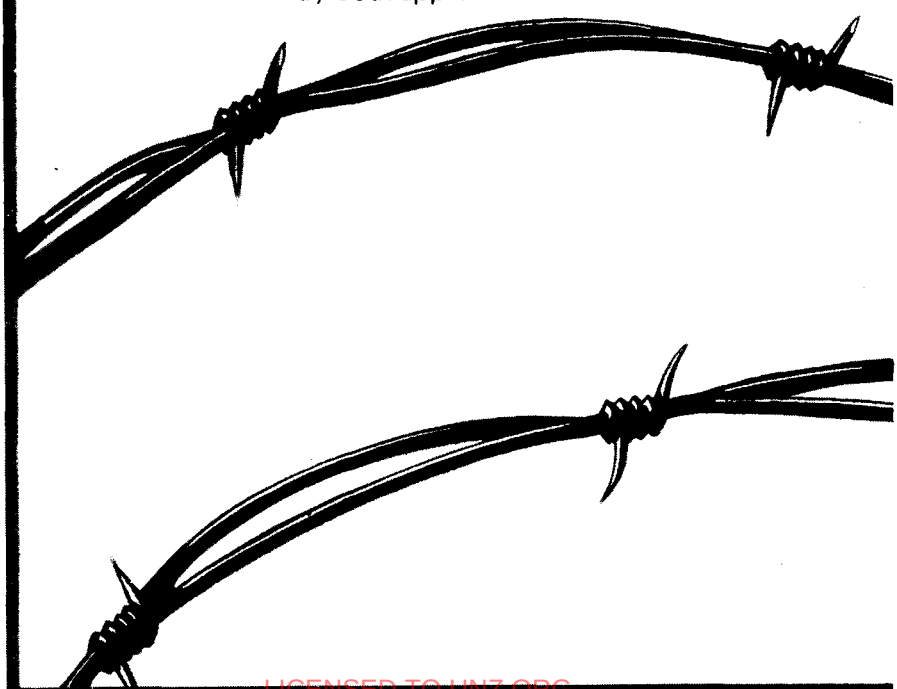
HE WHO FIGHTS AND RUNS AWAY

Sam Nicholson

There are two ways to deal with a problem: solve it or run away from it and start over. Fortunately, there have always been people willing to try both approaches.



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Terence Dahl was ten years old when his parents decided to emigrate to the Gen Pop space wheel. He was the wrong age for uprooting—too old to forget Earth and too young to understand why his parents were joining the Great Escape.

Their small Midwest town was still comparatively safe. As long as Terence kept to the patrol-guarded blocks, he could walk to and from school without being mugged or accosted by pimps and drug pushers. He had never gone out after dark and did not understand why his parents minded staying home. The town council's losing fight against health spa brothels and bookstore pornographers had no meaning in Terence's young life.

He knew that his mother had been upset when their house had been burgled while they were on vacation. Mom had put the silver and jewelry in the bank long before, but the burglars smashed her good china and slashed the furniture. It sure had been awful but (reasoned Terence) everybody got burgled and slashed. They just made the insurance company pay for it.

Terence never dreamed his parents would plan changes behind his back. He was surprised and shocked when his dad came into the kitchen one Friday evening in late September and announced, "It's all set for the wheel, Anna. Monday the space van comes and moves us out."

His mother looked quickly at him, slipped the programming cassette into the microwave panel, and said, "Let's talk about it before we eat."

He followed his parents into the living room. He felt as if the floor had dropped from under his feet. Leave home? Leave Earth?

Mom sat on the repaired sofa and drew Terence beside her. Dad pulled a footstool up to the coffee table and sat facing them. He took a folded diagram from his pocket and spread it out on the table.

Terence looked away. He blurted, "I don't need to see a map. I know all about space wheels."

"Don't you even want to know what wheel?" coaxed Dad.

After a moment Terence said reluctantly, "Well, which?"

"The General Population wheel. It's an American colony. You won't have to learn new laws or a new language. Gen Pop sells food and space products to the other wheels, and exports to Earth. It has a diversified population, not just technicians and theorists."

Terence asked, "Are you still going to be an electronics engineer?"

"Yes, my work will be much the same as on Earth."

"And Mom? Will she go out to work? Are you going to put me into a Care Center?"

"Why, Terence," said his father gently, "how could you think we'd shuffle you off to what the psychologists call 'benign neglect'?"

"Because that's what they do to kids on wheels."

"You misunderstand. Yes, a family living in hostel cubicles and eating in communal dining rooms can pile up quite a salary deposit, but I figured a nice wheel cottage would be more important to us than money."

Terence asked doubtfully, "A real cottage, with our own furniture?"

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"Mostly furnished. We bring our own linens and kitchenware."

Mom interposed, smoothing the white streak in her brown hair, "What about the silver in the bank?"

"I'll get it Monday," said Dad. "It can be crated with the rest."

"But there's so much theft in the moving business," she objected.

"On Earth, yes. These are wheelmen, spacemen."

Terence felt lost. He mumbled, "It's all man-made, isn't it? No skies or rivers or trees."

"There's farming dirt," said Dad, "robot-dug from the Moon and Mars. Inner Sol cargoes arrive steadily—dirt, minerals, water."

Terence persisted, "But Earth is—natural. A wheel can't take Earth's place. People belong on Earth."

Dad thought a moment. "People belonged on Earth in Noah's time, too. But he knew a great flood would make it temporarily uninhabitable. He built an ark and tried to save what he could. Maybe there were many Noahs. There are many flood legends. The arks floated above the flood and waited for the waters to recede."

"I suppose you mean we're having a flood of crime," said Terence, "but, Dad, Earth has always had criminals and outlaws."

"Earth has had lawbreakers, yes, but not today's great flood of sick minds. It's not that the police and courts have lost all control over criminals. It's that the criminals themselves have no consciences, no awareness of right and wrong. The thief believes he has the right to steal. The murderer blames his victim for his crime.

"Normal people like us have no defense against this sick flood. We're an endangered minority. If we don't run away, we'll drown. The space wheels are arks where decent families can live until the flood recedes."

"How long will it take," asked Terence, "for the flood to recede?"

"Not in our lifetimes," said Mom bitterly.

Dad said in a cheerful voice, "Let's act as if we were moving to a nicer neighborhood because I'd found a better job. A wheel needs no apologies because it's man-made. Mankind is pretty wonderful, too."

"Not if they run away," argued Terence.

No one spoke for a moment. A bell chimed in the kitchen. Mom jumped up and hurried to take the dinner from the microwave console.

Dad said to Terence, "Your mother is a nervous wreck from hurt and fear. We can't sacrifice her. The fight is already lost."

Terence felt overwhelmed, yet convinced his father was wrong.

"Don't tell anyone we're moving," his father went on. "We don't want to risk a spite-hit."

Terence nodded. If a local crime gang found out that a family was moving to a wheel, they bombed the house out of spite at seeing victims escape.

The weekend dragged for Terence. Why go through the motions of Saturday and Sunday? Monday morning he went to school as usual. He left his mother presiding over a systematically torn-apart house. Most of their clothing would be left behind. Wheel styles were so different: like colorful resort wear.

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School was sad for Terence because he could not confide in anyone or say "good-bye." He copied the homework assignments he would never finish, and walked home with the gang.

As they neared his street, they saw patrol cars slowly cruising the area. "Hey, what's going on?" his friends asked. Then they saw the huge armored space van in front of his house. They stared and drew away from him, as from a traitor.

Terence said, "We're going aboard an ark, like Noah."

"Yeah, Noah was the guy that left all his friends to drown," came a comment.

"Probably there were other arks," said Terence, "just as other space arks are being built at this minute. Get aboard as soon as you can." He paused, and added awkwardly, "Good-bye, everybody. It was fun knowing you."

"Good luck, Terence," they said stolidly. "See you around."

He ran across the front lawn. The last crate was being carried down the walk. A real estate agent was locking new steel shutters over the windows, so the house wouldn't be gutted before it was sold.

Terence's heart beat more quickly. His breath came in parched gulps. He heard his mother's voice in the house, but he could not go inside. He went into the back yard. It wasn't much. Thieves kept ripping up the best bushes. But there was a scraggy chrysanthemum border, and weedy, frost-touched nasturtiums.

Terence went over to the nasturtiums and began collecting the seed pods that had fallen to the leaf-covered dirt. He pocketed all the seeds he could find. This much of Earth he would take with him. Maybe Noah's kids had done the same.

He heard his mother's voice. "So there you are! Come and wash your hands. There's still soap and a towel in the bathroom. Dad is waiting in the car."

Terence obeyed slowly. "Where are we going now?"

"Just to the hotel downtown. It's not safe to drive after dark. Early tomorrow morning we'll start to the spaceport."

"When will we board the shuttle?"

"We'll lift off in a small feeder vehicle the day after tomorrow and join the big shuttle in orbit. It'll take about a week for the shuttle to load passengers and freight."

"And how long after that, to reach the Gen Pop wheel? A day?"

"No. The freight shuttles take longer than the passenger expresses. Maybe four or five days, depending on how much cargo the shuttle has to load and unload."

Terence noticed his mother's bright-cheeked animation. He said, "You're not sorry. You're not going to miss our friends or—or anything."

"I'm not sorry at being released from a madhouse, no."

Terence wondered how she could forget sunrises, and butterflies, and snowflakes sifting through pine branches. He would never forget. Never.

Two weeks later Terence was watching the viewscreen in the shuttle's passenger lounge. The Gen Pop wheel was much larger than the other wheels. As

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he watched, the wheel seemed to become vertical.

"We're adjusting our approach, to slot in," said Dad.

Behind the outer wheel rim flared a concentric tube like a flattened doughnut. Terence knew this was the up-spoke farming area.

Sparks seemed to wink on and off in the surrounding space.

"The barrier field," Dad explained. "It atomizes space particles and debris that might hit the wheel."

Mom added, "And possible spite missiles, too."

"How do we get past?" asked Terence.

"The slotting computer leads us into a safe tunnel through the field."

Soon the smooth silver rim seemed to be rolling over them, like a silver wagon wheel rolling over an ant. Terence shrank from the awful illusion of being steam-rollered. Then a groove opened in the silver. The shuttle slid into it as easily as a swimming beaver slides into his underwater doorway. The shuttle was slotted.

Shuttle gravity increased and became wheel gravity. The passengers gathered up their cabin luggage and exited topside into a sub-avenue plaza with fountains and flowerbeds.

A moving staircase brought the shuttle passengers up to avenue level, at a monorail station in the middle of a town square. The light was sunny and diffuse. The blue color overhead looked like sky.

The square had a courthouse, town hall, post office, and shopping area busy with midday traffic. The civic buildings flew the colony flag, the stars-and-stripes with a superimposed golden wheel. The flags were really flying, in the light breeze from the air circulators.

"It'll take a couple hours for the freight handlers to unload and deliver our crates. Let's find a nice restaurant, eat lunch, and go shopping," Dad suggested. "I've got a wad of wheel credits from the sale of our car to the spaceport dealer. We can add to the clothes we bought at the spaceport shops."

Mom held her bulging handbag closer. "Maybe a quick lunch. I'd rather find our cottage and wait there for the crates. The silver is gone—I know it's gone. But I just have to sit in the cottage and wait until I know the worst."

Dad did not argue. He drew Mom's arm through his own and started walking, Terence trailing along. They left the monorail station and stopped at a quick-order cafe on one side of the square. After hamburger and french fries, just like home, they continued along the avenue. Beyond the shopping area was a park that seemed to vanish into wide horizons on either side, if you did not look too critically at the artfully painted scenery bordering the juniper hedges.

Beyond the park was a residential neighborhood. Gabled cottages with neat front lawns and burgeoning kitchen gardens were set in a maze of cozy paths and rose-twined fences. Dad had to consult the wheel diagram before they could find the path to their cottage. A black wrought-iron sign on the gatepost said DAHL, and a black-enamelled mailbox was already crammed with advertising circulars.

They walked silently up to the cottage. Dad took a shiny key from his

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pocket and unlocked the door. It opened into a front hall with a thick gold-colored carpet and white woodwork. A pretty stairway led to the upper floor. The air smelled fresh and clean. Through an archway to the right was the living room. The gracefully white-framed furniture had comfortable, floral-patterned cushions. Terence said,

"Hey, this is super, Dad! It's like a TV sit-com house."

His father's face brightened. "Do you like it, Anna?"

She turned from stroking the china swirls of a table lamp. "Oh, it's lovely. I don't care if all the crates are stolen. I'n so happy!"

She dropped onto the sofa and burst into nervous tears. She waved aside their efforts to calm her. "I'm all right. You two shop—explore up-spoke. I don't know why I'm crying. I'd rather be alone."

Dad and Terence knew she did not really want to be alone. Terence walked through the house, noting the big Welcome basket on the kitchen table, and ran into the back yard. In the middle was a 20-foot by 10-foot plot of dirt, with watering jets.

Terence drew from his pocket the seeds he had saved from Earth, and planted them at the corners of the plot. He peered into the neighboring gardens, happy to see bees and butterflies. Even the approach of the narrow, section-jointed freight cart distracted him only briefly from the gardens.

Then Dad called him inside. Mom was in the dining room, with a smile that lit up the cottage. The heirloom coffee-and-tea service and the silver candlesticks were laid out on the buffet.

"Isn't it beautiful?" Mom bubbled. "Nothing was stolen! I've never been so happy! I never want to see Earth again!"

So, as Terence had feared, it was not an ark. It was forever. Or until he was grown up, that is.

The nasturtiums bloomed year after year, a border for the vegetables Mom grew, cooked, froze, and sold. Mom bloomed like a rose, too. By the time Terence was thirteen, he had two younger brothers, Jo and Japeth. Sol System name-variants were popular on the wheels.

Mom was obviously wrapped up in the new family, as if she wanted to forget the past. Terence saw that his dad was making special efforts to include him. He wished he could explain that it did not matter. He was not jealous. To the contrary, he was relieved at being let off the hook. His younger brothers freed him from responsibility. He could leave the wheel at any time, without worrying about his parents' future.

Besides, the kids were funny, affectionate little creatures. He got a kick out of playing with them and knowing they hero-worshipped him. Later, when they began to think and learn, he felt sorry for them because they would never know Earth. He tried to describe snow and skiing, oceans and ships. The wonderful things of Earth were always separate in his mind from the temporary evils. Mom would not let him separate them for the youngsters.

"And once we went to the East Coast, to swim in the sea. It was salty and very cold," he would say.

Overhearing, Mom would snap, "And

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you couldn't leave a towel on the beach but what it was stolen! You couldn't leave a car and not have the tires slashed, unless you paid a young hoodlum protection money! Tell them everything, Terence! Tell them how people were raped in the bathhouses and mugged and killed in the parking lots! Tell them about Earth!"

Terence saw that Jo and Japeth would always be spacemen, with hatred and contempt for Earth. He had no way to counterbalance his mother's words. All the arguments were on her side, as the floods of crime and vice rose higher.

By the time Terence was eighteen, the Dahls were Old Residents, and the cottages and hostels were fully occupied. The wheels started asking each other, "Where do we go from here?" The unanimous answer was, "Out."

As Dad reported to the assembled family, after a Council meeting, "The wheels together are self-sufficient. Our food, fabric, and pulp biomass cycles are steadier than Earth's. Minerals and ice are abundant in the asteroids. The plan is for the wheels to establish a base out there and begin Waystations to Proxima Centauri."

Jo and Japeth, now aged seven and six, stared with bright approving eyes. Terence asked, "Where will your base be?"

"Vesta looks the most promising, a silica and sand asteroid easier to build domes on than the bumpy rock-iron conglomerates. We'll have a new wheel propulsion ready in two years. Meanwhile, all wheel immigration is closed, to forestall vice infiltrators."

"Don't make that mistake," said Terence immediately.

"What mistake?"

"Forcing the crime bosses' hands. Let them keep hoping for a breakthrough. Let them get a narcotics pusher past, now and then."

"Terence!" scolded Mom.

But Dad said quietly, "Go on."

"Either the wheels have sane, healthy-minded citizens, or you can forget the new base. The trouble with Earth isn't that drugs and vice are peddled—it's that they're bought. A drug-pusher is no threat unless he has a sick-minded market."

"Of course he's a threat!" insisted Mom. "When we were on Earth—"

"The threat to us was only fear. We had no drug-related illness, no venereal disease. Neither did our neighbors. None of us bought vice. None of our neighbors here will buy it."

"How can you be so sure?" retorted Mom. "Mental sickness is just as infectious as physical plagues. Maybe you're immune to smallpox—but would you let a smallpox peddler onto the wheel?"

"Aw, Mom, vice and crime don't come from a virus."

"And they don't come out of thin air, either. They're fostered, enhanced, and peddled by greedy criminals. Earth's sickness is being deliberately spread by human rats, and the infection is more widespread and deadly than the bubonic plague. It will warp and cripple the entire human species."

Dahl glanced at the round-eyed apprehension of his younger sons. He said, "Don't overstate the danger, Anna. Even the Black Death had natural limits and ebbed away as mysteriously as it had come. Earth is a resilient planet and

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tends to phase out any aberration that goes too far."

There was a silence. Then Terence said, "Over the short term, Dad, I still advise humoring the syndicates. Don't risk a spite hit of atomic warheads."

He avoided his mother's angry gaze and went upstairs to his room. Her words had affected him more than he wanted to admit. Had he been too confident of wheel immunity? Was every human mind sickness-prone?

At this time, since wheel education was far superior to Earth's, Terence was in his first graduate year of space engineering. His choice of field reassured his mother, who could not see how space engineering might apply to Earth.

Yet he kept his nasturtium border flowering, and in his vacations he worked for up-spoke farmers. One day, as he climbed from the cab of an onion weeder, another farm hand sauntered over to him. He was a stranger, a teenager with Earth's city pallor still on his face.

"You're the Earthman Dahl?" said the youth. He had narrow eyes and a sly smile.

"Aren't we all Earthmen?" returned Terence coolly.

"Nah. Earth's a dirty word with these fat cats. You wanna go back to a good job?"

Terence felt a thrill of anticipation. "Doing what?"

The youth's eyes shifted to make sure they were alone. "I'm Louie Lombos. My uncle is Pile Rod Lombos." He paused. When Terence did not respond, he said, "Don't mean nuthin', huh? Your dad ain't told you about the Lombos mob?"

"No." Terence considered. "What does the Lombos mob peddle?"

"Whatever you want. Trip pills, heroin, joy-oh girls, hard liquor, gambling, pornovision. You name it, you can get it."

"Why have you approached specifically me?"

"Because people say you're Earth-homesick. Always talking about Earth history and scenery. You're an Earthman. You want freedom, not these wheel anti-everything laws. You want your First Amendment rights to do as you please and to hell with everybody else."

"I don't want anything. I do pretty much as I please."

"Huh. When you can't even sniff a tube of glue without being deported? When there's a dollar limit on the space hockey pools? When you don't even know how much there is to do, because you're not allowed to do it? How do you know what you'll want until you try it?"

Terence raged inwardly. How dare the vermin mock at freedom? How dare they so obscenely distort the Bill of Rights? How dare their sick minds subvert even logic itself?

Suddenly, all he wanted to do was to return to Earth—and kill rats.

He put a sneer on his face. "Aw, cut out the spiel. What I really would go back to Earth for is money, and your uncle wouldn't have enough."

"Not enough! Pile Rod Lombos controls everything from Montreal to Key West—from New York to the Mississippi. A power station wants atomic fuel, they gotta buy from Lombos. A business wants protection, they buy

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from Pile Rod. Uncle's got more money than anybody!"

"So? How does that do me any good?"

"You're just the guy Uncle sent me out here to get! A guy whose old man is on the wheel council, with a line to the secret technology. A guy who wants to go back and live it up on Earth. Listen, Dahl, Uncle wants to expand the business, but he can't. He's under pressure from the West Coast mob. He's wasting manpower on the competition when he oughtta be mopping up the Security squads in the hold-out pockets.

"The thing is, we're stymied because technology has moved into space. The field barrier, f'r instance. The scientists that can build it are on the wheels. If a scientist has a bright idea, he moves his family and himself to a wheel, so's they can't be snatched. If you wanta come to Earth and work out a mobile field barrier for Uncle, you can name your own money."

Terence put on a reluctant interest. "An Earth deal sounds good, but a mobile field barrier is out. It's impossible. There could be other tactical armor, though."

Louie said, "I'm only a contact man. You know a scientist named Quel?"

Terence shook his head.

"Quel's on Pile Rod's team. If he came to the wheel on a business visa, would you talk to him?"

"If the meeting looked accidental, yes. I can't risk—"

"Sure, sure. We'll work it out. I'll let you know."

Louie grinned and slunk away.

Later that evening, after his mother and the younger kids had gone to bed, Terence told his father about his encounter with Louie. He went on, "Remember, Dad, I never wanted to desert Earth. I always wanted to stay and fight."

"Fight what? A moral miasma enveloping the whole planet? The bubonic plague didn't stop because a few rats were exterminated. It stopped after it had run a natural course we don't really understand. The only defense against a plague is removal, isolation."

"Dad, there's two parts to this problem—the moral miasma and the criminal acts resulting from it. Earthmen could at least defend themselves from criminal attacks. They could live in houses built like space capsules, self-sufficient, with their own food, air, and water. The houses could even have field barriers."

"But you'd need millions of houses!"

"Not if each house were built like a medieval tower. The long-range firepower could protect a whole suburban neighborhood."

"Medieval towers could be fifty feet high, and yet men scaled them."

"Men can scale walls, but they can't climb a greased steel pillar."

"Pillar?"

"I'd build a nuclear-powered space capsule that could rise twenty feet above the ground on a central pillar. But not like a car on a car lift, with underground mechanisms that could be sabotaged. I'd have the lift machinery incorporated into the upper part of the pillar, which would be about forty feet overall. The house would slide up and down around it."

"The living space would be small," objected his father.

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"I visualize a two-storey capsule. One level would be a four-room apartment. The other could hold the life-support systems, food stores, and even biomass food culture flats."

The older Dahl looked thoughtful, interested. "How could you get the pillar-houses set up? Transporting large-diameter forty-foot pillars—planting them firmly—assembling the house units. The mobs would wreck the project before it started."

"Not if the mobsters believed the strongholds were for them. Not if Pile Rod ordered them. He builds—we throw him out and take over."

"But, Terence, how on earth could you eject the mobsters from the barrier-protected fortresses?"

"By enclosing a sonic cell-cooker among the sealed systems. Remote control from an orbiting satellite could shut down the barriers, trigger the sonics, and return the houses to the ground. Security squads could remove the dead mobsters and take over the hardware, which would not have been affected by the living-cell destruction.

"Let's say the wheels could build six hundred houses during the next two years," continued Terence. "If only six mobsters were cooked in each house, Pile Rod would lose several thousand key men at one blow. Security would take over the houses, and a lot of neighborhoods could be isolated from the criminal infection."

"That's crazy, Terence," smiled his father. "Key mobsters won't be sitting atop a pillar, like a gull on a flagpole."

"Oh, I'll figure out a way to get the top men into the sonic traps for the countdown. But, Dad, you and your friends will have to find reliable persons in Earth Security. That's a job for your generation. You still have Earth contacts."

They sank back in their chairs. After a moment Terence said, "By the way, do you know of a scientist named Quel? Louie said he'd come here to meet me."

"Quel?" mused his father. His glance quickened. "Osmund Quel?"

"I don't know about the Osmund. Who is he?"

"He was a so-called 'peace advocate.' Worked in sensitive defense projects and then spilled what he had learned to the newspapers. There was a Communist connection, but the East bloc was already splintering, so nothing was done about it. I hadn't realized he was making bombs for Lombos. He'll never get a visa to the wheel."

"You'll have to make sure he gets it, Dad. We can't blow this chance."

"Chance for what? Erasing mobsters?"

"Erasing them as a part of giving Earth Security the pillar-houses. Even though the sick flood may be beyond human control, the sane people deserve a refuge here and there, don't they?"

The elder Dahl rubbed his head. "I'll talk to the council. Maybe we can go along with your idea, for a while."

Several days later Louis intercepted Terence on the rim avenue and said that Dr. Quel had been granted a business visa and would be arriving on the next Friday's passenger express. He would meet Terence in his neighborhood park.

At the appointed time Terence gathered up an armful of books and walked to the park. He sat on a bench, spread out the books, and pretended to study.

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Sooner than he had dared hope, a hoarse voice wheezed, "Say, can you give me directions?"

He looked up. He saw a portly man in a tourist jumpsuit, an opened map in his pudgy hands. Terence noted unkempt hair, flabby jowls, a red-veined nose, bag-hung rheumy eyes. He felt suddenly out of proportion, too well-grown, too clear-eyed and healthy, too alien.

He heaped the books together. The man sat beside him and continued, "Okay. I'm Quel. You're just like Louie described you." He made a pretense of sharing the map. "What's wrong with a mobile barrier?"

"A wheel barrier is a constant field in what, for practical purposes, is a vacuum. If you built a barrier within Earth's atmosphere, the impinging gases would form a blinding nimbus."

"The field could have blank sectors, like the slotting tunnels."

"Yes, but Dr. Quel, the hardware would be bulky and heavy. It would need a vehicle like a locomotive, going along a level track to keep the field at a constant distance from the ground. What tactical use would such a vehicle be? Anybody could mine the track."

Quel thought this over. "Louie said you had an idea for building something else."

"I personally can't build anything. My idea would involve classified wheel technology, and the wheels wouldn't send it to Pile Rod Lombos. Unless Pile Rod can find a front man with top Security clearance—"

"No problem." Quel's rheumy eyes glistened. "What's your idea?"

Terence gave a carefully edited description of the pillar-houses. "They're for mopping up the small towns and suburban areas, where Security squads and vigilantes can hold out because everything is loose-knit, disconnected.

"The town we used to live in," Terence went on, "could be pinned down by a pillar-house at each end of the interstate. In two years the wheels could deliver six hundred house units, while Earth foundries were turning out the pillars."

"Will the vigilantes stand around and let us build one impregnable fortress after another?" scoffed Quel.

"Not if you build them one after another, of course," countered Terence. "The pillars and houses will have to be stockpiled until all of them have been delivered. Then they can be distributed at once and set up in a concentrated blitz."

"Did you bring the blueprints?"

"Well, I've got a diagram. Did you bring any offer from Lombos?"

Quel waved an expansive gesture. "Lombos is generous. Don't worry. If he likes the diagram, he'll send you some nice presents."

"You weren't listening, Dr. Quel. Lombos can't steal my idea and have the houses manufactured on Earth. Only the wheel technicians can integrate a barrier field with the life-support systems and defense weapons. Either Lombos pays what I want, or I'll torpedo the deal with the wheels."

"Well, what are you asking?"

"First, an advance payment of ten percent commission on the six hundred houses, the amount to be deposited to my account in an Earth bank."

"And?"

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"I also want to visit Lombos on Earth when the houses are finished. They're my houses."

"Sure, why not?" shrugged Quel. "Would you like Pile Rod to line up anything special for your visit? A custom-built car? Yacht?"

"No, I guess not." Terence took the diagram from his shirt pocket, slipped it into the wheel map, and returned the map to Quel. "I just want money to spend and a reason to celebrate and have a little fun."

"What kind of fun?"

"I don't know. A wheel is boring as hell."

Quel coughed a laugh. He rose. "I think Pile Rod will meet your terms," he said, and ambled away.

Terence's hands trembled as he unpinned the mini-sender from the underside of his shirt collar. The council would have an earful to discuss at their next meeting.

He wished his remark had not sounded so convincing. He *was* bored on the wheel. Everybody was bored. That's why the more adventurous souls were promoting the Waystations to Proxima. Proxima was a thrilling new challenge. Earth was just a terminally infected planet they had written off.

Ten days later his father drew him aside and said, "The pillar-house idea has been broached to the wheel council by the president's special advisor on organized crime, no less."

"It's depressing to know that Pile Rod has the federal government in his pocket."

"When haven't they been in somebody's pocket?"

"But how can we make viable security plans?"

"By avoiding federal agencies altogether," said the elder Dahl, "by trusting only people we're sure of—our brothers, cousins, and old friends in our home towns."

"The council has agreed to the cell-cookers?"

"Yes, but we don't like a locked, pre-programmed signal."

"Why not? I'm pretty sure I can con the mobsters."

"But you might be caught inside a pillar-house when the signal activated!"

"I don't want a hostage situation. I want the countdown to continue, regardless. So a scream boils through my guts. So what? One life is nothing."

Dahl rubbed his chin and looked thoughtfully at his son.

Although Terence continued his graduate studies, he put the rest of his personal life on hold. Every evening he and his father conferred over the progress of the pillar-house project. Pile Rod was pouring his amassed capital into it.

The wheel planners could not guess which towns Pile Rod would choose for his blitz. They simply developed a careful counter-intelligence.

Louie, restlessly pining for Earth, wanted Terence to leave Gen Pop as soon as the wheels signed the construction contracts.

"Go ahead to Earth, Louie," smiled Terence. "You don't have to wait for me."

"Well, Uncle kinda wants me to hang around. I mean, you're an important asset."

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"But I've got to finish my graduate work," objected Terence.

"Well, afterwards, you'll come to Earth and help set up the houses, won't you?"

"Why should I do more work than necessary? I did enough, inventing the houses. When I come to Earth, I want to have fun. I want to throw a big party and celebrate."

Louie was in complete agreement with this desire, and Pile Rod apparently found nothing implausible in Terence's plans.

When the delivery date of the final shipment was finalized, Terence and his father debated over the timing of the signal that would trigger the sonic trap.

"The pillar-houses should be operative during the second week of September," said Terence, reflecting that he would be returning to Earth ten years to the month since he had left it. "If I board the express here on that Monday, I can land with the Miami feeder on Tuesday."

"Lombos will be in Miami?"

"Louie says he's turned Miami Beach into a fortified base, and he seldom leaves it. Now, if I arrive on Tuesday, I can certainly target the hit for Saturday night. Let's say 9:00 P.M. local time."

"I wish you'd wait and release the satellite signal yourself."

"With what? I'll bet that both my luggage and myself will be electronically searched. Quel may not be the world's best scientist, but he'd recognize a signal activator. I'll be much safer if I play it my way."

As departure day approached, his mother began to fuss. "I can't understand why you're risking your life for Earth," she complained. "We've been so happy here."

"I had roots," smiled Terence. "They didn't come up. It's nobody's fault."

"But you have such fine opportunities in space!"

Terence grinned. "Aw, Mom, you just want me to marry the girl next door."

"I'd settle for your awareness that there *is* a girl next door. Your emotions are marking time in a border of nasturtiums."

Terence laughed. "I'll be all right on Earth, Mom."

The evening before he was to board the shuttle, there was a tenseness at the supper table. Terence was conscious that his kid brothers were so excited that they could hardly wait for him to finish his second helping of lemon pie. As if on cue, his mother brought an oblong gift-wrapped box from her apron pocket and laid it before him.

Terence undid the gift-wrapping and found a jeweler's box. He opened the box. It held a gold wristwatch, the very latest example of space technology.

He was taken aback, too touched to speak.

"Your old watch isn't any good for Earth," explained his mother. "I knew you'd be swimming in the sea—and maybe skiing and falling down. You'd need a pressurized watch that could stand jolts and temperatures.

"And see—it has an Adjustamagic Permalock band, so you can wear it all the time, and it won't fall off or get too tight."

She ran out of breath. Terence locked the band around his wrist and said,

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"Gee, Mom—Dad—you shouldn't have—"

Nine-year-old Jo spoke up, "We didn't want you to forget us when you're on Earth and we're way out at Vesta."

"Aw, hey, kids, we'll be seeing each other," said Terence in an unsteady voice. "Vesta is only a hoot and a holler from Earth. You're not getting rid of your old brother so easily."

The next day his mother cried when he boarded the express, and Jo and Japeth looked lost and scared. Terence reflected that his departure was cutting off a part of their roots, and he felt a momentary pang. However, the kids were spacemen. They would remember him only as a damned fool trying to save a self-destructing species.

Louie spotted the new watch even before they had found their shuttle seats. "That's a fancy clock, and real gold, too," he commented.

"I'm afraid my parents did without a lot, to afford the watch. I wish they hadn't given it to me," said Terence.

"Ah, take all you can get," advised Louie.

The next day the express arrived at the orbit station. Since Louie seemed to have appointed himself bodyguard and tour guide, Terence sat comfortably in the lounge and let Louie check on the Miami connection.

In a few minutes Louie returned. "Bad news," he reported. "The feeder ain't lifting out for Miami today. Hurricane."

"Hurricane!" exclaimed Terence.

"Yeah, September is the hurricane season. Could take a week before the winds let up and the feeder can land."

"Oh, no," breathed Terence. Would he get to Earth in time to arrange for the trap on Saturday night?

Louie looked at him curiously. "What's the matter?"

"It's just that I had forgotten how unpredictable Earth weather is," said Terence.

"How about renting a stay-over suite, so's we can watch TV?"

Terence would have preferred individual cubicles. He sensed that as long as he was part of the Lombos mob, he would never be alone. He reflected that that was why they were called mobs.

The TV reported that Earth was having even lousier weather than usual. A new volcano chain was steaming out of the sea near Iceland, causing heavy fogs. Europe and North America were having constant rainfall. Chile had suffered an earthquake. Australia baked under a heat wave. Scientists were worried about a rapid calving of Antarctic ice.

The oceans were lashed with storms. The current hurricane over Florida would be followed by another, later in the week.

There had been a time when weather control had seemed feasible, but the scientists who could have brought it about had emigrated to wheels that had no weather problems.

On Wednesday, the first hurricane having blown past, the Miami feeder took aboard passengers and began the descent.

As soon as the glow from the atmosphere burn faded, Terence peered eagerly down at Earth. He had forgotten how large and roomy it was. The distances were real, not cleverly painted backdrops. On the wheel he had been

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a pot-bound plant. Now he could feel his roots expanding until they never again would fit into a space structure.

His expansive joy shrank as the feeder landed at the Miami airport. The landscape was hurricane-drenched and blowsy. The airport building was no better. A liveried chauffeur met them at the airline gate and took their luggage checks. Louie led Terence through a shabby, littered concourse marked by empty ticket counters and boarded-up shop fronts. Wherever Earth's diminished population might be traveling, it was obviously not to Miami.

Outside in a No Parking zone was a long black limousine and a second liveried attendant, who sprang to open the rear door at Louie's approach. Louie dived inside. Terence, unaccustomed to the hot, muggy Florida air, hesitated on the pavement.

"Inside!" Louie snapped. "Let's get a bullet-proof car between us and the guys that'd like to cancel a Lombos."

Terence folded himself into the car. Louie turned on the TV, opened a bar cabinet, and offered Terence a drink. Terence said wonderingly, "Have you forgotten about space lag? A succession of different gravities places stress on human balance. A stressed system can't handle toxic chemicals."

"Toxic chemicals, huh," muttered Louie derisively. He poured himself a solid shot of Scotch, downed it with an "Ah" of satisfaction, and settled back upon the velvet upholstery.

The chauffeur came with their luggage. When it was stowed in the trunk, he sat behind the wheel, the bodyguard sat beside him, and the limousine zoomed forward, picking up a motorcycle escort.

Getting into character, Terence commented, "Gee, this is the life!"

Louie said, "Yuh," and clamped his jaw tight. His face had paled to a moldy green.

The Lombos headquarters were in the only remaining hotel on Miami Beach, a pseudo-Versailles palace with wings that curved toward the beach. For security reasons Pile Rod had ordered the other hotels dynamited and the rubble bulldozed into an anti-invasion wall along the sea front. Tide-borne sand was beginning to sift over the cracked concrete slabs, shattered plumbing, and rusted steel rods.

The limousine skidded to a dramatic halt in front of the hotel's grotto-like entrance. The doorman released Terence with a flourish. Louie lurched after him. Yes-men converged on them as they entered the dim, musty-smelling lobby. Louie clutched a pair as they embraced him.

"Carlos—Salvatore. I had a rough reentry. I gotta lay down. Find somebody to take Dahl to Uncle."

At that moment two shapely girls clad in white shorts, tailored blouses, and tennis shoes came out of an elevator. Louie croaked, "Rose!" and the girls came over to them.

The first girl had dark curly hair that shone and bounced, and a flawless oval face. Her dark eyes were liquid magnets that drew Terence into them. He came out of his drowning sensation to hear Louie say, "Dahl, this is Uncle's daughter Rose."

"Hello, Terence," smiled Rose. "Louie didn't video us how nice you'd

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be! Meet my partner Vera. We're a recording duo called *Spice*."

Vera was as blonde as Rose was dark. She was attractive, but her eyes had no magnets.

Louie hurried into an elevator. Rose said, "Come on, Terence."

The group moved in unison. Like royalty, thought Terence.

They crossed the lobby and emerged in the pool-and-garden space between the hotel's curving wings. Directly ahead, at the near edge of the beach, was a sight that brought Terence up short.

At the top of its massive steel pillar was a pillar-house, a smoothly molded two-storey capsule with blank-mirror windows that stared like dead eyes. Though it was dwarfed by the multi-storey hotel, it looked aloof and menacing.

After they were past the pool, the escort stopped. The girls led Terence forward. The house slowly, almost imperceptibly, descended. When it rested on the ground, the front hatch slid back.

Terence followed the girls into the Lombos-modified interior, a single luxuriously furnished lounge. The wall was silk-tapestried; the plump-stuffed chairs were satin or velvet. There was a semicircular bar. The stairway that curved around the central core was sheathed in white filigree. Terence assumed the upper floor was also for luxury living, not for subsistence biomass flats.

A dark-haired, large-mustachioed man wearing a bloused, widely unbuttoned white pirate shirt and white slacks narrowing into gold-tooled white boots emerged from a nucleus of business-suited lieutenants. Gold chains roped his hairy chest; diamond rings flashed from his fingers.

He opened his arms, said in a deep warm voice, "My boy, my genius, welcome to Earth!" and gave Terence a bear hug and a brushy kiss on each cheek.

Terence was liking mob membership less and less. Pile Rod continued, "The desk phoned me Louie is space-sick. A nice boy but foolish. Sit down, Terence. You know Quel. Meet Stefan — Brosco —Vitasi." He addressed his daughter. "Rose, you told me you were playing tennis? You should meet Terence later?"

"Oh, Papa," said Rose in a soft amused voice, "that's when I thought he was a total loss like Louie."

Terence saw she was younger than he had supposed, sixteen probably. The blonde Vera was older, with mature watchful eyes which apparently had a reassuring message for Lombos. After glancing at them, he said, "All right, but go sit down somewheres while we talk business. Vera—the scotch and ice, rye for Quel, ginger ale for the space-lagged wheelman."

The girls hurried to the bar counter. Terence was steered to a seat among the lieutenants, in a circle of chairs around a large low table. An inlaid map of the continent covered the center of the table.

Pile Rod settled back in the most imposing chair and beamed. "I have made a high-class shack, eh, Terence? Now I show you what I do with the other pillar-houses."

He leaned forward and pressed a button under the table. Clusters of lights winked from the continental map.

Terence interposed, "Are all the pillar-houses activated, Mr. Lombos?"

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"The weather has delayed the work. Not for a century has there been such weather. But today or tomorrow the gangs finish the last."

Vera came with a tray of drinks. She set the tray before Lombos and walked back to Rose. The mob boss dealt out the drinks (thought Terence) as if they were medals of valor.

Quel rattled the ice in his glass of rye. "Ask the kid about the mobile barrier field he says is impossible. The houses can activate individual fields."

"When they're twenty feet above the ground," said Terence quickly, "and stationary. A barrier that would destroy indiscriminately and dig itself into the road—"

"Quel, the boy is not here ten minutes," admonished Lombos. "A little patience, eh? The new offensive weapons will come. For now, let's see what the pillar-houses give us."

He waved his hand at the lights winking from the map. "Under cover from the pillars, I can develop more small town plazas. I can build a casino, a joy-oh spa, a thrillervision, without sabotage from the vigilantes. A new plaza always earns big. A million dollars net, the first year. Our wheel genius gives us a hundred million extra revenue!"

The lieutenants grinned. Terence said, in his best hayseed manner, "Gosh, I didn't know there was so much to celebrate. I've been thinking—but I guess I shouldn't say anything."

The lieutenants smiled at each other. Pile Rod said jovially, "Say, my boy, say!"

"Well, I wanted to do something real wild with my commission when I came to Earth—something wheel people would think was extravagant. So I thought I would throw an enormous party for each pillar house, all at once. Champagne and steak and everything I've read about. Ever since I was a kid I've wanted a real wingding Saturday night."

He broke off. "Now that I'm here, it sounds nuts. Saturday nights don't matter on Earth." He looked shyly around the lush lounge. "I don't even know how to throw a nice party you and your friends would come to, Mr. Lombos."

"Steak and champagne begin fine, my boy," smiled Lombos. "You want Saturday, Saturday it is. But six hundred parties will peel away your bankroll."

"That's the whole point. I want a party to remember."

"We'll take care of it. Brosco, you heard?"

"Yes, Mr. Lombos. What time?"

"You have a time, my boy?" asked Pile Rod indulgently.

"Well, I wouldn't want to take up your whole evening," stammered Terence. "If we began at eight—I don't really know—"

"Champagne and steaks at eight, and after we eat, my boy, you will be our guest in the Seatop Room. Brosco, I want the best acts from New York—"

"And *Spice*, Papa!" called out Rose. She ran to her father and sat on the arm of his chair. "Vera and I are the top of the charts."

"But not for the Seatop Room. So raw is the comedy—"

"We'll sing right here, then, at Terence's party!"

Terence's heart nearly stopped. He wanted to jump up and yell *No*. He clutched the arms of his chair in in-

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creasing horror as he realized that his sonic traps would kill more than mobsters.

Pile Rod glanced at him, and misread his pale emotion. "You don't see such beauty on the wheels, eh? But she has had too much success too young."

Vitasi's quiet voice reminded, "The conference of mayors, Mr. Lombos—"

"Yes." Lombos rose vigorously to his feet, the lieutenants rising also. "Brosco, you begin with the parties. Quel, Stefan, we meet the mayors. Vitasi, you stay here with Terence, so the girls don't pester him too long."

The mob boss marched out of the house like a king in a phalanx. There was a momentary silence while his vital presence dissipated. Rose plumped herself in her father's chair. Terence, who had risen with the rest, sat down again. Vera cleared the glasses from the table.

Vitasi remained standing and said to Terence, "Louie got drunk?"

"No. Just one drink while space-lagged. He didn't seem to mind not having liquor on the wheel."

Vera said, "You've got the wrong man servicing the suite, Vitasi. Kell is as alcoholic as Louie."

"Who isn't?"

"The slap-happy palooka you've got in the penthouse. He's training for a come-back."

"Can he valet?"

"Oh? Is Kell a valet? Give Percy a try, Vitasi."

Vitasi walked behind the bar and picked up a cordless phone.

Rose said to Terence, "Now tell me all about the wheel. Is it really a nice place?"

Vera answered, "Of course it isn't. Terence wouldn't have been so eager to come to Earth if he'd liked the wheel. Right, Terence?"

Terence pulled his shocked wits together. "Yes—yes, the wheel was very dull."

"Oh, but Terence, you can say more than *that,*" protested Rose.

"Life is much simpler—we lived in a cottage—" Terence rambled distractedly, appalled by the way his murderous plan was unfolding, and conscious of Vitasi's cold steady gaze.

After half an hour of a conversation that was becoming more and more difficult, he wondered if he was suffering from a serious gravity maladjustment. His face felt flushed, his forehead tight, his body clammy. He shivered, and his voice failed.

"Not feeling well, Terence?" asked Vitasi. "Perhaps temperature-sensitive? I'll have someone show you to your suite."

"Vitasi, no!" pouted Rose.

"Come on, Rose," said Vera, rising from where she had been seated, next to Vitasi. "We'll take Terence. We have to get back to the penthouse anyway." She and Vitasi exchanged a glance. "Someone will be looking after Louie."

Terence felt worse when he was on his feet, dizzy, with a stuffed-up head. He nodded to Vitasi and let the girls escort him out of the house. As he crossed the storm-ragged garden, the absurd futility of the Versailles headquarters struck his fevered brain. He began to laugh.

"The plague victims didn't know what they were going through, either," he said indistinctly. "They saw people

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dropping down and dying—and they thought they were being punished for their sins—they didn't know about viruses—didn't even recognize the rats—just a mystery that came and went—''

A sharp pressure on his arm stopped him. Vera asked, ''Did you have your Earth shots before you boarded the shuttle?''

''No. Wheelmen are healthy—immune—let the sickness peddlers come—''

Rose asked, ''What's he saying, Vera? What's wrong with him?''

''Forgot his Earth shots,'' said Vera. ''Every virus at the orbit station zeroed in on him. He's gone off his head. If he's lucky, he only has influenza.''

Virus infection, of course. The logic cooled Terence's fever. He was silent as the girls led him through the lobby and into an elevator that rose with nauseating speed. They emerged into an ornately paneled corridor and stopped at a door that was opened by a big bull-necked man in a gray warm-up suit. The man had close-clipped hair, flat ears, and a lumpy face.

''Percy. So you're here already. Good. I've a second patient,'' said Vera.

They entered a wide sitting room. Sliding glass walls led out to a balcony overlooking the beach and the sea. A desolate lowering scene, thought Terence, moving to the glass and peering down.

Vera was saying, ''Call Pile Rod's doctor. And get the wheelman into bed.''

Terence turned around. He saw that a doorway at either side of the sitting room led to bedrooms. He assumed Louie was sleeping off the space lag in one bedroom, and he protested vaguely at being ushered into the other.

Rose stepped forward and smiled, ''Please, Terence. You want to be all better for your party, don't you?''

The party! How could he cancel it without betraying Security squads who were even now counting down to the Saturday takeover? How could he save Rose?

His tormented mind reeled. He staggered—clutched out for support—and found Rose, soft and perfumed, in his arms. A stronger grip pulled him away and supported him into the bedroom, while Rose's voice said, ''Oh, Vera, don't scold. The poor lamb was practically unconscious. If you tell Papa—''

Terence fell on a bed and heard no more. He was aware of Percy pulling off his clothes, wrapping his shivering body in a blanket. Somebody else put an icy stethoscope disc to his chest, and drove a needle into a resisting arm muscle.

After a night at the bottom of a swamp, he floated up into a pool of sedation bordered by the hothouse flowers of sympathy sent by Lombos and the courtiers. He was being carefully tended by the valet Percy (now more appropriately clad) and Louie, on deck again and aggrieved. As soon as Percy had left the room, Louie sat on the bed and urged, ''Look, Dahl, you gotta get Uncle to transfer us to New York or Philly. Maybe, if you catch him in a good mood at the party—''

The party! Terence groaned.

'' . . . giving me a hard time because I took a drink when I was spacelagged,''

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Louie was saying. "Okay, I used to get sauced up when I was a kid, but I ain't touched a drop for two years, and that guy Percy grabs the bottle Kell gave me as a coming-home present, and whenever I'm in the penthouse Vera watches me like a hawk. What's this deal between Uncle and Vera? I thought she was a songbird who'd teamed up with Rose."

"She's Rose's bodyguard, of course," muttered Terence. "A female Vitasi. Keeping the machine running where Pile Rod wants it. A hint here, a jab there."

"She's got it in for you, too, has she? I bet it's because you grabbed Rose yesterday. You gotta be careful—"

Terence pulled the covers over his ears and sank back into the swamp.

Friday morning, whether from antibiotics or a strong constitution, he was weakly ambulatory. He insisted on showering, shaving, and dressing. He propped himself in a sitting-room easy chair and gazed through the sliding glass panels at the roiling Atlantic. The tide was very high on the beach. The rubble wall was just a thin, isolated breakwater.

Shortly before lunch, when he was basking in relief at having got rid of Percy, a male nurse, and the doctor, only Louie sat with him. Vitasi looked in, withdrew, and came back with Rose and Vera. The girls were attired in high-heeled, silk-bodiced, slit-skirted elegance. Louie hastily set chairs for them. Vitasi slung a chair for himself and signified with a nod that the visit could begin.

Rose engulfed Terence with her magnetic eyes and said, "I had to see for myself that you were better. Papa tells me only what he thinks I ought to know. Or want to know."

"You're very kind," said Terence. Vera's watchful gaze gave him an idea. He continued, "You're the loveliest sight I've ever seen."

Rose glowed. "As pretty as the flowers I sent you?"

Terence had not looked at the cards on the flowers. He smiled, "No flowers could be so lovely." As he spoke, Vitasi's eyelid winked briefly at the girl herself, so he added, "Roses from Rose — no other flowers touched them."

Rose turned to Vera. "I told you he noticed!"

"I haven't thought of anything but you since I met you," said Terence. "I wish I could snatch you away and wrap you in cotton wool."

"Papa wraps me in mink and sable," said Rose. "Aren't they as safe as cotton wool?"

"Maybe, but they're more than I can afford. I'm in love with an off-limits princess. I shouldn't be talking this way, should I?" he went on. "Your father will keep you away from my party. And I wouldn't blame him."

Vera spoke up. "Because you're still feverish, wheelman, we'll forget you said it. Come, Rose."

Rose stood up, took a cassette from her glitter-studded handbag, and laid the cassette on a table. "Our latest album." She bent over Terence and kissed his forehead. "Vera, you're wrong. He's not feverish, he's sweet."

Vitasi opened the door. The girls glided out of the room, leaving a trail of exotic scents. Vitasi paused and looked back at Terence, who smiled.

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"Thanks for the assist, Vitasi. I owe you one."

Vitasi nodded, smiled, and left the room, closing the door softly.

Louie fumed to Terence, "Wipe off the lipstick. You're going too fast. Nobody talks that fresh to Rose. Vitasi gave you an assist with the flowers, but he'll tell Uncle. You've just about shot any chance Rose had to be at the party."

Terence was shaky with relief and hope, but he managed, "Aw, Pile Rod wouldn't want the kid there, anyhow. Play the cassette."

Louie fed the cassette into the stereo. The gut-pulse rhythm and sex-obsessed lyrics seemed to abuse the undoubted talent and discipline that had gone into the recording. Terence could hardly bear to listen to Rose's sweet clear voice in such degrading harmonies.

During the day the weather worsened into blustery squalls. The doctor would not let Terence leave the suite. He was eating supper there with Louie, Percy and a waiter in attendance, when Pile Rod walked into the room. He gestured "Out." Louie and the attendants retired to the next room. Lombos sat down in Louie's chair and asked, "What am I hearing from Vera and Vitasi? That you forget Rose is still a child?"

"I'm sorry, Mr. Lombos. I wouldn't hurt Rose for anything on Earth."

"Of course not. You're a good boy from a good family. For two years I have known you through Louie. Have I said I don't want you to fall in love with Rose?

"But first, I must see how you fit into the organization. Rose must have the best. Until you make yourself the best, I don't want Rose falling too much in love. An off-limits princess, you said? Strictly off-limits, my boy, yet I already love you like a son."

"Louie warned me you'd keep Rose away from my party."

"What's a party? Those girls don't eat. Diet snacks, that's all."

Terence's heart pounded so violently he could not speak. Pile Rod went on, "Why won't you give me the mobile barrier?"

Terence took a deep breath. "You've built an empire, Mr. Lombos. Why waste its resources in border skirmishing?"

Lombos stroked his luxuriant moustache. "Because it is an empire where the wealth evaporates, eats itself up. For a year, maybe two years, a new plaza shows a big profit. The customers are middle class. They have jobs, savings. I give them value for their money—honest gambling wheels, uncut narcotics, glamor with the sex. They like it. They spend big.

"But after a couple years," he continued, "the middle class is gone. The plazas go over to junkies and whores. I have to move to new territory."

Terence reflected that wealth had to be produced, not burgled or conned out of people's pockets, and a sick-minded population doing their own thing in casinos, brothels, sadistic thrill movies, and dirty-book stores did not produce wealth. They were not even learning how to maintain the technology they had inherited.

The bottom line was survival, not a quibble about personal freedom. A civilization either produced and evolved, or it degenerated and vanished.

"So you see," Lombos was saying,

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"I need the weapon that will let me expand."

"I'll put my best effort into it, Mr. Lombos."

"Good boy," approved Pile Rod. He nodded and left the room.

Saturday morning was overcast, but the air was warm, and there was no wind. Terence insisted on getting up, dressing, and going down to the swimming pool. Louie had to accompany him, of course. They sat in padded loungers on the pool deck.

Beyond loomed the pillar house, observing him with its blank eyes. He knew he would die in the house when the sonics were triggered. The project was a ship he had launched. He had to go down with the men he would kill.

At the pool, a bikini-unclad bathing-capped figure took light steps onto the diving board and executed a perfect dive. Louie remarked, "Hey, that's Vera. I didn't think the girls got up so early."

Vera swam ten pool lengths in a fast crawl, climbed a near ladder, unpeeled her bathing cap, shook out her blonde hair, and came over to them. Louie rose. Terence remained seated and said, "I'm not strong enough to be chivalrous. Take Louie's chair."

She did so, saying, "Bring my towel and radio, Louie. They're across the pool."

Louie sulked a moment. His glance shifted nervously to the looming pillar-house, and he went. He returned with a large fluffy towel and a transistor radio, which Vera put between Terence and herself.

A hard-sell commercial blared out. Louie complained, "Does Rose let you have that junk blasting?"

"If you don't like it, go away," said Vera, leaning over to dry a high-arched foot. "In fact, you can go up to the penthouse and ask the maid for my beach robe. I won't tell Pile Rod if you scrounge a couple drinks."

"You know I'm not supposed to leave Dahl." Louie's glance shifted again to the looming pillar-house. "Uncle's probably watching."

"Then he'll see I'm keeping Terence company."

Louie walked away. Vera swathed herself in the towel, draping it over her head to form a concealing hood.

The radio commercial led into a weather report. A stationary trough was blocking a deep low over the Atlantic. The volcanic activity off Iceland was increasing. The Red Cross was removing the near population. The North Atlantic ice line was dipping south at a time when it usually firmed. Bermuda waters were choked with floes.

"Around 1830 the Labrador Current brought icebergs all the way down the Florida coast," remarked Terence. "Ice is nothing new."

The report was continuing. Hawaii, Indonesia, Sicily were shuddering and vomiting lava. The sea bottom was rising like yeasty bread between New Zealand's North and South Islands. Tidal waves were smashing southern Africa, South America, Australia. The great Antarctic land-based ice was melting.

"And it's all happened before?" came Vera's ironic voice.

"Many times, but not recently."

Vera asked, "Looking forward to your party?"

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"Shucks, yes. Did you and Vitasi really lower the boom on Rose?"

"I thought it best she stayed her distance. We're consoling ourselves in Miami. Can you sneak away and join us? We'll get you back in time for the Seatop Room show. I can fix it with Vitasi."

"Sorry. It's my party," said Terence. "I have to see it through."

"Rose will be disappointed."

"Isn't it your job to keep Rose happy?"

"She's a happy-type girl. What did you think of the *Spice* album?"

"A lot of study and talent went into it."

"And a lot of garbage came out?"

"You said it, I didn't." Terence glanced at the radio. "Is—?"

"They lip-read. Be careful. What time is it?"

Terence pulled back his cuff. "Almost ten o'clock."

"Nice watch," commented Vera. "Don't leave it around. One of the mob would snitch it in half a second."

"Don't worry," smiled Terence. "My folks paid extra for the Permlock band. Nobody is snitching the watch—except from my dead body."

"We'll hope it won't come to that," said Vera. She pushed the towel from her head. "If I don't get back into the pool, I'll freeze."

She recapped her blonde hair and ran to the diving board. Terence shut off the radio, thoughtfully. If even the pool furniture was bugged, there was not a great deal of trust in the Lombos organization.

The day became increasingly unreal. Terence knew he would have to stop looking at his watch. Somebody might begin to wonder.

At eight P.M. Louie and a squad of lieutenants escorted him down to the pool. The space beyond had been transformed by a lofty pavilion that stretched from one wing of the hotel to the other. A galaxy of colored lights shone on linen-covered tables and bright silver. It was like a scene from the Arabian Nights.

Barbaric magnificence paid for by barbarian rapine.

Guests were arriving, status-clad mobsters with their glittering women. Too bad the women had to die, but Rose would not be among them.

Terence forced himself not to look at his watch. It was early yet.

The pillar-house descended. The hatchway opened and was locked in that position. Lombos, flanked by lieutenants, stepped outside. He was more than ever the swashbuckling pirate. Heavier chains swung on his chest, between shirt frills. A red sash topped his wide pirate breeches, and his boots were higher and fancier.

He embraced Terence ceremoniously. "I see you are still not well, my boy. But you can walk around for a few minutes? Meet the guests?"

The royal procession threaded through the champagne-drinking crowd, with all the relevant touches. The gracious shoulder pat. The royal quip and the too-hearty response. But it all was taking time.

At last Pile Rod and the lieutenants escorted Terence into the pillar-house and over to the bar, where Quel was sitting. Lombos said to Terence, "Now you can drink a little champagne?"

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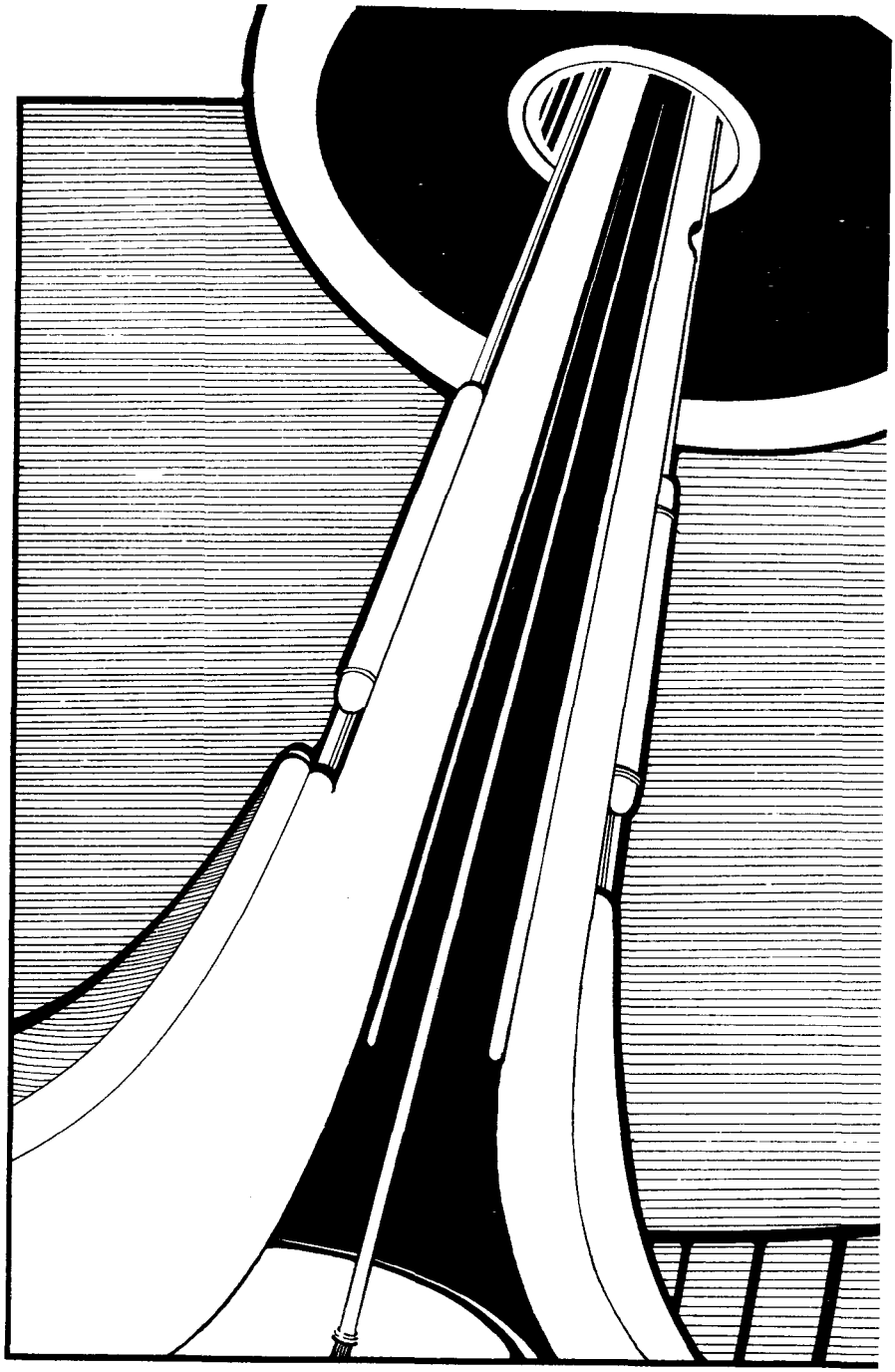

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"Yes, now it wouldn't hurt," said Terence.

He clinked glasses and sipped the tart, nose-tickling liquid. Maybe he should get what Louie would call "really stoned."

But he could not drink unless Lombos drank, and the monarch's sharp eye was noting details. Lombos spied a waiter setting bread sticks at a table, and beckoned him to the bar. The man, who was husky enough to match the palooka Percy (thought Terence idly) hastened to obey.

"So, Eddie, Armand has sent a bouncer to serve at my table. Where is Pedro?"

"The old man got too excited, Mr. Lombos. Shaky, like. Armand—at the last minute—and me being an extra waiter anyhow—"

"Good," approved Lombos with a wave. "I am used to Pedro. I forget he is not so young."

Lombos returned to the champagne, thus permitting Terence to do the same. Terence was now almost in shock from suspense. His hand trembled on the glass. Lombos noted this, also.

"Come, sit down, my boy. You should be in the hospital. Eddie, bring the glasses."

As soon as Lombos sat down, the lieutenants sat at the other tables. Terence tried to show enjoyment of caviar he could not taste. What time was it? He had to know. He looked at his watch. Ten minutes *after* nine.

He could have sobbed aloud with relief. The triggers had not gone off. Something must have interfered with the signal. Never could the vaunted space technology have failed at a better moment. He did not want to kill Lombos. He did not even want to kill Louie, wherever the nephew had decamped to.

Terence relaxed. He would have liked more champagne, but his glass was empty and the bottle seemed to have been taken from the ice bucket beside the table.

There was a muted commotion by the door. Rose, a sweet-faced angel in ivory satin, was entering. Vera, in gold lame, followed her.

Lombos stood up. Terence swayed to his feet. What had happened? What was going wrong?

Rose glided to her father in bashful triumph. "Now don't be mad, Papa. We had to see."

"Rose, you're a naughty girl," said Pile Rod fondly.

"Terence must have a drink with us, and then we'll go," said Rose. "You'll let me have one drink, Papa? Oh, but there isn't any!"

"I'll get champagne from the bar," said Vera, picking up Terence's glass.

Eddie came with a champagne bottle and glasses at the same time Vera placed a brimming glass in front of Terence.

The girls were given places at the table. The champagne was poured and the mutual toast was given. Terence drained his glass at a gulp. The drink did not taste as good as it had before. He had no tolerance. His head felt funny.

He had to get Rose out of the hotel grounds. What if technicians were trying to unjam the signal? The trigger could go off at any time.

Somebody was talking. Lombos. "The boy is sick. Maybe alcohol and antibiotics. Where's Vitasi—Brosco?"

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Vera's voice said, "I'll get an ambulance, Mr. Lombos."

"At the bar is a phone." Low-voiced confusion. Lombos again, "I tell her the bar, so she runs out the door. Vitasi, phone the hospital. Eddie—"

Strong arms dragged Terence to his feet. With a tremendous effort he raised his head and saw that Eddie was on one side of him and Lombos was on the other. Where was Rose? He said thickly, "Rose! Rose!"

Lombos answered, but he could not understand the words. The Arabian Nights scene was being blotted out by a dark cloud.

He came to consciousness because he heard the lashings of a storm. Apparently the expected hurricane had broken through the stationary trough. The people at his party would be getting wet. Where would they be serving the steaks? His party!

He opened his eyes to dawn's gray light. He was in a hospital room, lying fully dressed on the bed. A terrible storm was beating against the window. Lombos, in bedraggled pirate finery, was sitting beside the bed, slowly wiping away the tears that seeped from his reddened eyes.

Terence thought, "Oh, *no!*" He choked, "Mr. Lombos, what—happened?"

Lombos looked at him with great sadness and pity. "My poor boy, my almost son, I made a mistake."

"You—?"

"I should have known the wheel brains would not let the barrier field come to Earth. They would not let their young genius build for Pile Rod Lombos."

"But what—?"

"They put sonic traps in your pillar-houses, my boy, to cancel you out with the rest of us."

"All the houses?"

Pile Rod nodded. "How do I know how many of us died? Thousands."

Terence looked at Pile Rod's grief-glazed eyes, and his heart nearly stopped. He asked, "Rose?"

Pile Rod sobbed, "I sent her back, into the house. I saw she was following. I don't ever want her to see unhappiness. The boy she loves is sick, maybe looks drunk. Rose shouldn't see. I told her I would take care of everything, and I sent her back to Vitasi."

"No!" breathed Terence.

"As soon as the ambulance is a mile away from the hotel, the trap closes. I don't even know, until we are here."

"I should have stayed," faltered Terence. "I should have shared Rose's death."

Lombos pulled himself together. "Maybe we don't live another hour anyway. My organization is gone. Brosco—Vitasi—Stefan—Quel—"

"Louie?"

"Yes, even poor Louie, who had sneaked upstairs to help himself to Pile Rod's scotch."

"How do you know for sure who—?"

"Who died? The Army colonel shows me a list of everybody his decontamination squad brings out."

"A decon squad? But you said—I mean, a sonic trap would have a non-contaminating fusion trigger."

"How could the colonel know? On Earth such triggers are fission, with bad fallout."

The door opened. Two decon-suited

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figures entered, their faces invisible behind the lead-clouded hood plates. The larger figure was carrying a space needler.

Lombos jumped up and cried, "No! You won't shoot the boy like a dog!" He drew a small pistol from his waist sash.

The figure raised the needler and sliced Pile Rod's body apart. It fell to the floor, a dead, bloody heap.

Terence struggled up. "Kill me too! I don't want to live."

The second, smaller figure seemed to be pointing its glove at him. He saw the barrel of a stunner. He gasped, and blacked out.

He woke up in a decontamination rescue sack that bounced and swayed. Through the face plate he could see that he was in an ambulance. The storm was pounding, thrumming, splashing. A decon-suited figure sat beside him. He fumbled for the sack's communication button, on the inner rim of the plate, and croaked, "Where are we going?"

Vera's voice answered, with the tinniness of the sound box, "To your father."

His father! Bewildered, Terence realized Vera had been an undercover agent. Security had been given two years to infiltrate, and she had done a good job, using her talents to win supervision of Rose Lombos.

He blurted, "Rose! Did you have to kill Rose?"

"We thought she was safe. She was on her way. We thought she would stay close to you, but her father sent her back. I'm sorry, Terence, I really am."

"And Lombos? He died thinking I was a friend."

"What did he have to live for?"

"With Rose dead, what do I have to live for?"

"The same thing you were expecting to die for. Earth."

The ambulance was halted, then allowed to proceed. It stopped at the hotel entrance. Two decon-suited figures opened the rear doors, pulled the sack-immobilized Terence off the stretcher and carried him through the deserted lobby, Vera walking ahead.

They went through the storm-torn pavilion, past tables still laden with platters and glasses, and into the opened hatch of the pillar house. They laid him beside the bar and spent several minutes clearing the lounge of tables and sonic-withered food, throwing everything into the pavilion. Then they closed the hatch and sent the house up the pillar.

"The barrier field is inoperable," said the figure at the control panel, in a voice Terence could not quite place. "The fusion trigger must have scrambled it."

"Get me out of this sack," grumbled Terence. "There's no radiation danger."

"But there's a hurricane," said Vera. "The decon suits were all we had to protect us."

Her two companions lifted Terence to a chair near a window. He wriggled his face plate to the widest view, taking in one wing of the hotel and a sea that foamed into the garden. A storm-driven ice floe crashed into the row of palms at the edge of the lawn, flattening the tall trees and grinding them to pulp.

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What was the planet doing to itself? This was no ordinary storm.

The foaming sea ebbed—and ebbed — pulling the beach after it. The sand drained from the rubble. The pillar began sliding seaward as if a giant hand were dragging its cement base. The hotel wing sagged . . . and crumbled like a sand castle.

Watching from another window, Vera said, "The sea floor is bare to the horizon. I never pictured it as being so flat."

"We won't survive the returning wave," said Terence.

They waited. A growl resonated through the capsule and became a gut-shaking roar.

"The wave is a hundred feet high, and as wide as the horizon," said Vera. "If it breaks on top of us—"

Terence twisted to watch the wave approach, a solid wall halfway up the sky, moving inexorably toward them.

It did not break or punch. It pushed and lifted. The pillar-house was embedded within it, traveling with it, tilting forward as its cement foot dragged behind the air-filled space capsule. The wall swept on, dropping the pillar and breaking on the Miami shore.

For a moment the house rocked back and forth in a backlash. Then its pillar steadied upright in swelling water that reached to its windows. Miami Beach was gone. Maybe Miami was gone.

"We're floating," said Terence in disbelief, "like a weighted toy."

The three decon-hooded figures paused at the windows. Two male voices—and where had he heard them before? — commented back and forth.

"They've lost us. They'll never find us through the space window formed by the eye of the hurricane."

"The computers know the speed and direction of the tidal wave. They know where we probably are."

"This storm is something else. Maybe it won't have a window."

"Every hurricane has an eye. It doesn't need to be directly overhead, with the barrier plow."

Vera's voice, "We'll have to exit topside. Haul him up, boys."

A figure approached and threw the sack over its shoulder. Terence was bumped and banged as he was carried up the filigree-enclosed staircase. He was laid on a bed. He sat up unsteadily and saw a small but luxuriously furnished bedroom. He wondered if he was sitting where Louie had died.

On this upper level, the sea's heaving motion was more perceptible. He said, "I feel seasick."

"It's not the sea," said Vera. "It's the chloral hydrate I put into your champagne."

Terence forgot the queasiness. "Yes—you set a full glass in front of me."

"You weren't supposed to drain it at a gulp. You rushed our timing."

"Timing? The timing went wrong! How did you know that the trap—?"

"The barrier nimbus!" cried a watcher. "Burning a hole, north by east. Let's go!"

Terence was again seized and carried up a further spiral. The topside hatch was opening into the deluge. He was dumped onto the rainflooded roof. The hatch slammed shut. Someone fired a rocket that fizzed a veil of cloudy pink.

The sea rolled him against the guard-

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rail. He humped once more into a sitting position. Everything and everyone was the cloudy pink, including sea and sky, except for a widening swath of blue behind a blurry nimbus. The barrier plow had elongated the eye of the hurricane, and a large space copter was waiting for them to appear underneath it.

The copter plummeted toward the pink dye. A rescue net dropped with a stinging thud. Gloves opened the mouth of the net and rolled him inside. Figures jammed beside him. The net tightened and lifted.

The sudden motions were too much for Terence. He fought against dizziness, but slowly faded. He came to rest on a solid surface. A disembodied voice ordered, "Take 'er up!"

He awoke in a bunk, feeling comfortable in pajamas, and thought he was in his own bed on the wheel. He glanced at his wristwatch, and memory returned.

At first it was too much to take. He lay back blankly, feeling the distinctive heavy pull of an orbiter's induced gravity. A clinic robe and slippers were beside the bunk. He put them on, left the cubicle, and followed a narrow passageway to the observation lounge in the orbiter's midsection.

Four jumpsuited figures were seated at either side of a long central table, watching the large replay screen at the further wall. Their backs were to him, but he recognized his father and Vera at once. He stood quietly and identified the others. One was the waiter Eddie —and the other was the palooka Percy!

He gave an involuntary cry of surprise. The figures turned and looked at him. His father smiled and drew out a chair. Terence walked slowly to the table, sat down, and said in a tired voice, "Okay, infiltrating was a clever idea. But why didn't the sonic trap go off at nine o'clock? What was the reason?"

"You're wearing it, son," said his father, "on your wrist."

Terence pushed back his sleeve and stared at the fabulous watch.

"It contains an overrider," his father went on. "As long as you were within a kilometer of a trap, the signal would not activate. When Vera spoke to you at the pool and realized you could not—or would not—extricate yourself from Lombos's house, she and the Miami unit arranged for your abduction. I'm sorry she was so closely involved with Rose Lombos that the girl had to be part of the cover. But she was planned for. It was only by ironic mischance that she died."

"It doesn't matter," said Terence dully. "Everybody's dead anyhow."

"We hope not," said Vera. "The hospital was our base, and we hope it held."

"You were right, Dad," said Terence. "If a plague doesn't run its course, the planet takes care of it. My pillar-houses were just overkill."

"Not quite," said his father. "Watch the screen."

The picture cut back to a collapsed dam, water gushing through the broken cement. A wide murky lake moved through the tree-tops and lapped over roofs to which survivors clung. Bodies, human and animal, bobbed in the current.

There was, however, a floating patch of life. It was an island of small boats

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and makeshift rafts, billboards laid across telephone poles. They strained on ropes tied to a single mooring, the roof rail of a nearly submerged pillar house. Most of the floating survivors were women and children.

"An ark," said Terence. "I was reinventing the ark. But if this flooding is happening all over the planet—"

"I'm afraid it is," said his father. "The volcanic eruptions occasioned hot winds and warm rains. The melting of land-based glaciers at both poles is raising the sea level."

"When Nature exterminates, it doesn't do a halfway job."

"Nature is efficient because it has no heart. Nobody mourned the dinosaurs."

"I mourned Lombos," said Terence. "I liked him."

"I liked Rose," said Vera. "She was a really sweet child."

"She was a Vandal princess," sighed Terence, "gently reared, mink-wrapped. I'll never forget her. I'll never marry a girl next door." He looked at his father. "You and Mom saved me in spite of myself, but I'm not going back to the wheel."

"Where else, then?"

"Why, back to Earth. That's where my roots are."

The elder Dahl said earnestly, "Your roots were in an Earth that no longer exists—if it ever existed except in your imagination. I mean, you loved Earth from a safe cocoon of man-made technology."

"But Dad—"

"Hear me out. You loved snow, yes—when you were encased in thermal snowsuits or central-heated rooms. If you, as a naked human animal, had been

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thrust out into all that beautiful snow, it would have killed you before you had a chance to admire it."

"That was just an accident of latitude. Man is the result of a billion years of evolution."

"You speak as if there had been uninterrupted linkage between a trilobite and *Homo sapiens*. Not so, even within the primate family. The missing link between Lucy-in-the-gorge and Terence Dahl is still missing. Modern man has not *adapted* to the planet, like an Abominable Snowman or an Australian bushman. He has *modified* the planet until he finally can *escape* from it.

"Terence, you say that because man evolved on Earth, Earth is *ipso facto* his ideal planet. But I say that if man has survived Ice Ages, comet collisions, volcanoes, floods, and plagues—if he has conquered Earth's environment—he can conquer any planet that approximates Earth—and surely there are many of them.

"After all, from the galactic view, what is Earth? A wobbly unstable planet orbiting a third-rate boondocks star. Are you saying beforehand we can't do better out at Proxima Centauri? I reject such pessimistic pre-judgments."

After a silence, Terence looked at the others. "Do you Earthmen want me to return with you?"

Eddie said, "Well, in your place, I wouldn't go back."

"What do you mean?"

Percy ventured, "It would be a step backward, wouldn't it? Not all of us are geared to leave the planet. I'm not, myself. But you're a real spaceman. To come to Earth would be to waste your education."

Vera added, "Look at it this way, Terence. Your main contribution to Earth was an idea you developed on the wheel. Go back and develop some more."

"I'd be pot-bound," protested Terence. "I'd be cramped by artificial skies and fake horizons. I love Earth more than any of you."

"I never heard of a seaman who didn't love his home port better than those who lived there," smiled Vera, "and the further away he got, the more he loved it. Love Earth, but do the space jobs you understand."

Terence felt hollow, near tears.

His father said, "At any rate, come home so your mother won't blame me for your absence. Just a day of peace will help."

"Well, okay," said Terence.

He felt sorry for his father, married all these years to a girl-next-door, with not even memories of a gentle Vandal princess. ■

● How wonderfully we stand upon this world. Here it is we are born, bred, and live, and yet we view these things with an almost entire absence of wonder to ourselves respecting the way in which all this happens.

Michael Faraday

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GLUONS AND GLUEBALLS

Trying to understand the structure of "ordinary" matter may have led us to the discovery of a completely new kind—and we don't mean anything as prosaic as antimatter!

Over two centuries ago a Slavic Jesuit born in what is now Dubrovnik, Yugoslavia, advanced a simple, elegant, and at the time absolutely untestable explanation of the Universe. All of Nature's diverse forms of matter—from gunpowder to volcanoes to great grey elephants—is made, Roger Joseph Boscovich said, from "points" (particles) held together by one single all-encompassing force.

Boscovich's vision of a force was quite different from that of the Natural Philosopher who preceded him and whom he admired, Sir Isaac Newton. Newton had explained the motion of planets in stable orbits and the binding of atoms into molecules in terms of attractive forces that fall off as the distances between the constituent bodies becomes larger. In contrast, Boscovich's force between particles could remain constant as they were taken away from each other, or it could even increase.

This revolutionary idea of force was at first enthusiastically embraced, then scoffed at, and later simply forgotten. However, it has recently been revived and become part of the fabric of today's subatomic physics. The tale begins on a fateful April Fool's Day in 1964, when it was first suggested that the matter in the atomic nucleus ultimately consists of point-like "quarks." For example, a proton can be thought of as made from three quarks.

In 1964 no one had yet addressed the question of what keeps quarks together, or why the quark doesn't simply float out of the proton. The resolution of this

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Roger Boscovich: Father of an Idea

Boscovich was scientist and poet, diplomat and priest. In the former guise, he anticipated Einstein and postulated a forerunner of today's "unified theories."* His theory of matter had but one force and one kind of "point" (particle). The varied forms of matter were, he said, a consequence of the relative positions and velocities of the particles.

Boscovich was in his late forties when he finally put this idea into words in his "Theory of Natural Philosophy." It was published in the spring of 1758, and for almost a century and a half it was regarded as "a classic," particularly in England, where he was made a Friend of the Royal Society. This theory, however, dropped from sight during "the golden age of physics," when Einstein's dictum that "experiment is the alpha and omega of theory" reigned supreme and when, much to the latter's distress, the quantum mechanics was developed. By 1961 no one considered Boscovich's theory much other than an historical oddity.

On the 250th anniversary of Boscovich's birth, a group of essays concerning his life and work was published. The introductory paragraphs praised his theory of matter as "simple and clear, *but wrong*." The idea of "points" had, however, already been carried over into modern-day physics in the picture of electrons as particles without structure (that is, "fundamental" in the sense that they do not extend into space). It was Boscovich's peculiar force law which boggled the mind until, that is, it was discovered anew within the context of elementary particle physics. Only then did anyone see the connection between an 18th-century and a modern-day idea. Credit for this goes to Phillip M. Rinard, working far from the "mainstream" of particle physics in Emporia, Kansas. While no one would claim that Boscovich anticipated the bizarre behavior of today's elementary particle "zoo," there is nonetheless, as Rinard points out, a striking similarity between this Jesuit priest's idea of force and today's.

Boscovich's problem in carrying his idea further was lack of experimental data, something that cannot be said of today's physics. He, however, persevered and made a number of other intriguing speculations. Of particular interest are those, which his theory would allow, of Universes existing side by side, perhaps interpenetrating one another. His theory also allows a Universe, like ours, to (imperceptibly) expand and contract, leading to the further speculation that perhaps today's visible expansion may be followed tomorrow by an equally as visible contraction.

During his lifetime Boscovich wrote more than 100 books and papers, not all of which have been translated from the Latin. Apparently his writings on relativity and time remain—untranslated—in his native Yugoslavia. What wealth of ideas might be contained therein is an interesting question indeed.

*See "Supergravity," *Analog*, March 2, 1981

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(Continued from page 52)
question became even more difficult with the (experimental) realization a few years later that "free" (or single) quarks do not seem to exist. This is in contrast to historical situations where, by using an appropriate amount of energy, nuclei can be pulled out of atoms and, in turn, protons from nuclei.

As an explanation of this "quark confinement," Boscovich's long-ago postulated force was rediscovered. It must be—went the reasoning—that the harder one pulls on a quark embedded in a proton, the stronger the "glue" holding it in the proton must become. Looking for a free quark would thus, in such a picture, be as futile as looking for a piece of string with one end.

In the last few years, indirect evidence has begun to accumulate that this "new" kind of increasing force is not entirely a figment of the fertile imaginations of the modern-day counterparts of Boscovich. This picture of the nature of nuclear matter is described by a nascent theory with the colorful name of "quantum chromodynamics": quarks are held together by the exchange of still other particles called—what else?—"gluons." One peculiar aspect of this kind of dynamics is that the property that gives rise to an increasing force law also suggests that the gluons themselves can combine in strange new ways to form entirely new kinds of matter—solely of gluons, not quarks. Recent experiments suggest that both gluons and "glueballs," as they are sometimes called, may exist.

To begin our tale, we return to the end of World War II, when the physical basis of matter seemed to be clear-cut. Maxwell's description of electrically charged matter had been, after the discovery of quantum mechanics, redrawn into a new theory, to more closely reflect the fact that the atom is never quiescent. At its simplest—the hydrogen atom—one (negatively) charged electron is attracted by a (positively) charged nucleus, or proton in this case. Classically, just as the Earth is pulled toward the Sun by the gravitational force, discovered in the late 17th century by Newton, the electron is pulled toward the proton by the electrical force discovered in the 18th century by Monsieur Coulomb. However, in the new electromagnetic theory—quantum electrodynamics—the particle known as the "photon" is constantly being emitted and absorbed by the nucleus, hence binding the atom together.* Named by Einstein, the photon is also the particle of light; it represents a discrete bundle of energy. A sunbeam consists of a whole slew of photons, all traveling (of course) at the speed of light.

The idea of particle exchange as a way of binding or "gluing" things together can be roughly understood by imagining two ice skaters (the electron and nucleus, for example) in an ice rink (the atom) playing with a boomerang

**In the Earth-Sun case, the "force" the Earth experiences is also presumably nothing other than the result of lots of little particle exchanges. In this latter case, the exchange particle is said to be the "graviton." A consistent quantum theory of gravity does not exist, nor has anyone ever seen a beam of gravitons, or even the gravitational equivalent of a sunbeam.*

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(a photon). The first skater throws (as in our figure) the boomerang to the second by throwing it away in the opposite direction. The recoil from the boomerang thus pushes him a little bit in the direction toward the second skater. The boomerang then circles around the second skater and comes at him from behind. He catches it and recoils a little with the grab, being pushed toward the first skater. Neither skater ever touches the other; they interact only through the boomerang and yet they have been "attracted" to each other in the process. An important point in this analogy is that the boomerang can—in between throwing and catching—have a life all its own.

In the same way, an atomic nucleus can—at a more detailed level—be

Particles binding other particles together is somewhat analogous to two skaters on an ice pond, playing with a boomerang. The skater on the left (the proton, for example) throws the boomerang (the photon) away from himself and the other skater (the neutron). Its recoil pushes him towards his partner. The boomerang circles around in back of her, pushing her towards him. Etc.

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thought of as consisting of a certain number of protons and neutrons, which are held together by the exchange of a special particle called the "pi meson." After a false alarm on the heels of its postulation in 1935, this "pion," as it is now called, was definitively discovered in 1947 in experiments where cosmic rays from the outer reaches of space and time impinged on photographic plates. One would have said — and a few optimists did—that the structure of matter had more or less been satisfactorily explained. Gravitons could be said to hold the Earth in orbit, photons to hold the (electrical) atom together, and pions to keep the nucleus from falling apart. What more could anyone want?

Wanted or not, physicists were in the '50s and '60s deluged with new particles as accelerators bombarded matter with more and more energetic protons and pions. It now appears that the proton and pion have more than 250 relatives. Since each could be uniquely identified by its electrical charge and other (quantum mechanical) characteristics, each was then supposed to be a valid "elementary" particle. Physicists were in danger of being swamped by an overabundance of particle data. It was distressingly clear that the strong force holding the proton in the nucleus was far more complicated than anyone had ever envisioned.

The lifeline extended by two California Institute of Technology physicists, Murray Gell-Mann and George Zweig, was that of "quarks." The two (independently) proposed that all the many relatives of the proton and the pion could be sorted out in terms of just three fractionally-charged quarks.* Gell-Mann's paper (by chance) appeared on April 1, giving rise to an appropriate number of witticisms. Zweig's proposal was never published, but received wide circulation as a "preprint" from CERN in Geneva, Switzerland, where he was at the time working.

This idea of quarks is yet one more application of the ancient and well-used atomic hypothesis of Leucippus and Democritus, but to a level even deeper than the protons and neutrons of nuclear physics. It seems, moreover, to work. All of the known proton-like particles seem to be a combination of three quarks, and all the known pion-like particles seem to be composed of a quark and its antiparticle, or antiquark.

In analogy, quantum electrodynamics says an atom is excited to a higher energy when the configuration of its orbital electrons is changed. Just so, a relative of the proton or pion could now be thought of as resulting when its constituent quarks are in an "excited" state of higher energy, or mass. The newer unstable and slightly more massive particles are, in this model, no more than excited states of stable ones.

Very soon after quarks were postulated, however, a problem arose. Ac-

**This idea grew out of the earlier work of Gell-Mann and an Israeli Army colonel-turned-physicist, Yu'val Ne'eman. They had previously been able to organize a number of particles into groups of 8 and 10. Hence, Gell-Mann's optimism that the new triplet scheme would work.*

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cording to the original quark theory, there are some well-established combinations of three quarks which would all have to be of exactly the *same* variety at the *same* time and in the *same* place. This would be a serious violation of the semi-sacred Pauli Exclusion Principle, which expressly forbids the "pointlike" electrons and—by extension—quarks from piling up on top of each other. (Imagine, as once did Pauli, the chaos that would result if the electrons in an atom were allowed to all collapse into the same state.)

Instead of changing the rules of quantum mechanics, Yoichiro Nambu of the University of Chicago points out, the model builders decided it was far easier to alter the nature of the postulated quarks. Each of the original quarks was assumed, as Oscar (Wally) Greenberg of the University of Maryland proposed, to come in three different varieties. These varieties went in search of names for a bit, but have come to be known as "red," "blue," and "green." Gell-Mann's triplet had become nine: three quarks of three different sorts, each of which came in three "colors." Color is just a new label, which has nothing to do with the colors of our world. But it helped physicists avoid the previous problem of this violation of the Pauli Exclusion Principle. Those troublesome combinations could still be thought of as three identical quarks, all in the same state, but they differed with respect to their color—one being red, one blue, and one green.

Color is more than just a frivolous trick. For one thing, it provides a way of understanding why it is so hard to free a quark from its nest in the proton. Color can be thought of as akin to electric charge; an atom is at its stablest when it is electrically neutral. In the case of color, those states which are not "color neutral" will break up immediately into systems which are. The proton and all its known relatives thus exist and can be seen by us because they are "color neutral," being made of the appropriate cominations of red, green, and blue quarks. This is in analogy to the fact that physically mixing together the light from these three primary colors yields a white, or neutral, light.

A way of picturing the difficulties involved in getting a stable particle to give up a quark can be seen in "the bag," or "balloon" model, which has evolved in various ways. Perhaps the best-known version is that developed by Kenneth A. Johnson and his colleagues at the Massachusetts Institute of Technology. The quarks in any one particle are said to have carved out a niche for themselves in the vacuum. Picture a pion, for example, which is a quark-antiquark combination, and, like the proton, also color neutral. The quark might be "green," say, and the antiquark is "anti-green," or "magenta."

Experimental physicists somehow get a grip on the green quark in the "balloon," and they exert all their force on pulling it away from the antiquark. The magnitude of the interquark force, or connecting "rubber band" holding the two together, would be enormous. Nonetheless, the physicists can temporarily succeed in breaking this funny kind of band in two. The quark and antiquark momentarily fly apart, making

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two colored and separated pieces of matter. Almost simultaneously, however, two partners for these two loose quarks materialize from the surrounding vacuum to neutralize these colors, resulting in an energetically much less expensive system. Instead of prying a colored quark from a pion, the physicists have only managed to create another white quark-antiquark pair. Where once there was one pion, now there are two.

Yet for a very brief instant the green quark could exist without a partner. But this was true only at an enormous energy cost. In any practical case, the quark cannot be separated from its partner at all, since the saving in energy in making white, rather than colored, objects is overwhelming. At long range, the interquark force seems to grow (just as Boscovich envisioned his force doing). Since the gluons that mediate the interquark force also carry color, they also are thought to be forevermore imprisoned in a bag, or balloon, or more appropriate to our tale, a ball.

Color lies at the mathematical base of quark theory which, with the addition of exchange particles, the gluons, bears the name quantum chromodynamics. The mathematical similarity of this evolving theory to that of quantum electrodynamics is reflected in the similarity of their names. There are, however, deep differences between the two theories. In large part, this springs from the fact that quantum electrodynamics is a "linear" theory, whereas quantum chromodynamics is "non-linear."

In quantum electrodynamics there is only one kind of charge—electric charge—which comes in two forms, positive or negative. In contrast, in quantum chromodynamics, there are several "charges"—the three colors and their anticolors. Also, the photon alone mediates the force described in quantum electrodynamics, and it is electrically neutral.

In quantum chromodynamics there are eight gluons, none of which are color neutral. The gluons, which carry the color force, usually interact with quarks in such a way as to change their "color charge." Just as no one has ever seen a single free quark (because it is colored), no one has ever directly observed a gluon for the same reason. So says the theory.

Before reviewing the evidence for gluons, we must backtrack and talk briefly about the way physicists proceed to accumulate it. To the naked eye, seeing into the heart of matter is like seeing into a black box. Impossible! Yet the insides of that box can be illuminated; the secret is one of "the appropriate application of energy." Consider a man (a Natural Philosopher) who finds such a black box which he cannot see inside of and which he cannot pry open. He spies a pile of flat rocks along the river and decides to use one of those as his "key" to the box. He drops a rock on the box, but the rock is not massive (or energetic) enough to do much more than make a good noise and slightly dent the black box. He, however, has nothing larger. Then he realizes the box is under a tree and he hits upon the idea of climbing it and dropping one of his river rocks

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from there. Lo and behold! he shatters the box, only to find inside a smaller one, which seems still more sturdily built, for it cannot be demolished with his current tools—the tree and a rock. Having learned the lesson of the 30-foot-high tree well, he looks for a 25-story apartment building to extend the "energy" of his bombarding rocks still further.

The first particle accelerators developed were analogous to the Natural Philosopher's tools. Today's are even more powerful, for they involve not only a sitting duck target (the black box) and a bombarding particle (the rock), but beams of *colliding* particles. The difference is like the difference between a mouse charging a stationary elephant and two elephants charging each other. The energy released in the head-on elephant-elephant collision is much bigger. A better way for the Natural Philosopher to proceed, after he exhausts the possibilities of his apartment tower, would be to arrange for two of these littler black boxes to smash into each other like charging elephants.

It turns out that in the elementary particle world, a particularly efficient way of releasing energy is through collisions involving matter and antimatter, for example, an electron and its antiparticle, the positron. The (quantum mechanical) arithmetic of such a collision is quite simple. Since the characteristics of an antiparticle (expressed as quantum numbers) are considered to be exactly opposite to those of its corresponding matter particle, they effectively cancel each other out in a collision. The only caveat is that the final products of this collision must conserve the energy and momentum of the "parent" particles.

It was Richard Feynman of Caltech who pointed out in 1949 that one could draw "world lines" for a particle, depending on the fact that at a particular instant in time it is at a particular point in space. These diagrams not only show (in "slow motion") what is happening in a complicated particle interaction but, as envisioned by Feynman, they corresponded to mathematical expressions in quantum electrodynamics. (Though the mathematical underpinnings of quantum chromodynamics are not yet complete, such diagrams are also used to describe what happens in this theory).

A simple Feynman diagram,* which illustrates the conservation of energy and momentum shows (in **A**, page 61) the relatively infrequent reaction when a particle and antiparticle, coming together from two different angles, meet. They annihilate; electromagnetic energy is released (as represented by the wavy line, or photon). If nothing further were to transpire, energy might well be conserved. But not momentum. Hence this free electromagnetic energy must be turned into something else, as for example another particle-antiparticle pair, such as a quark and its antiquark. These then move away from each other, and as described above, a whole bunch of

**For the graduate students among you: Feynman diagrams are ordinarily drawn with "straight" arrows, but after years and years of such arrows, the author opted for a bit of change. "Momentum," you will notice, is nonetheless conserved.*

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other quark-antiquark pairs materialize from the vacuum to neutralize the available color.

Thus the energy of the initially charging electron and antielectron is converted into two showers of pions going off in the directions of the original quark and antiquark. These clusters of particles are called "jets" by modern-day Natural Philosophers. Only the particles in the jets are directly observed. The fact that the intermediate particles (in this and other reactions) were quarks must be inferred, and this often involves rather sophisticated analyses.

If the electron-antielectron collision also produced a gluon, that gluon would also materialize in the same way as the quarks. It is possible to sort out such complicated events at higher energies in the rare cases where the decay products separate into *three* well-defined jets.

In the fall of 1979 there was a brief flurry of excitement as it appeared "*The New York Times* proved there were gluons."* (Whether the illustrious journal carried out elephant-elephant scattering experiments to perform this feat is unclear.) The excitement can be traced to an international conference at Fermilab in Batavia, Illinois, where an American scientist tried to picture U.S. high-energy experimental physics more favorably than it perhaps deserved. European high-energy physics had recently taken a huge leap forward, in part through experiments using the new high-energy electron-positron storage ring (PETRA) at the laboratory known as DESY (pronounced "Daisy") in Hamburg. The U.S. counterpart, known as PEP and scheduled for the Stanford Linear Accelerator, had not yet come "on line." The implication was, of course, that if PEP had only been funded more generously, then the (three-jet) events clearly signaling a gluon would have been first produced by PEP in California rather than by PETRA in Germany. (Fuzzy signals which might have come from gluons had some time previously been seen at lower energies at Stanford.)

History is history, however. The first three-jet event was reported in the summer of 1979 as having been seen in Hamburg. In the ensuing two months further supporting data were collected by all four teams—bearing the acronyms TASSO, PLUTO, Jade, and Mark J—then working in Hamburg. It is the discovery of these events that constitutes the best evidence so far that gluons exist and that quantum chromodynamics is more than just somebody's speculative theory.

One would expect—from quantum chromodynamics—to "see" a gluon when a quark is accelerated. That is, the quark would give off or "radiate" a gluon, just as (in quantum electrodynamics) an accelerated electron emits electromagnetic radiation (that is, a photon). A gluon produced in this manner,

**This wry observation came from an MIT professor; his institution later issued a press release, claiming the "discovery" as properly having been made in Hamburg by that same professor, together with 57 "others" from MIT, Germany, and the People's Republic of China.*

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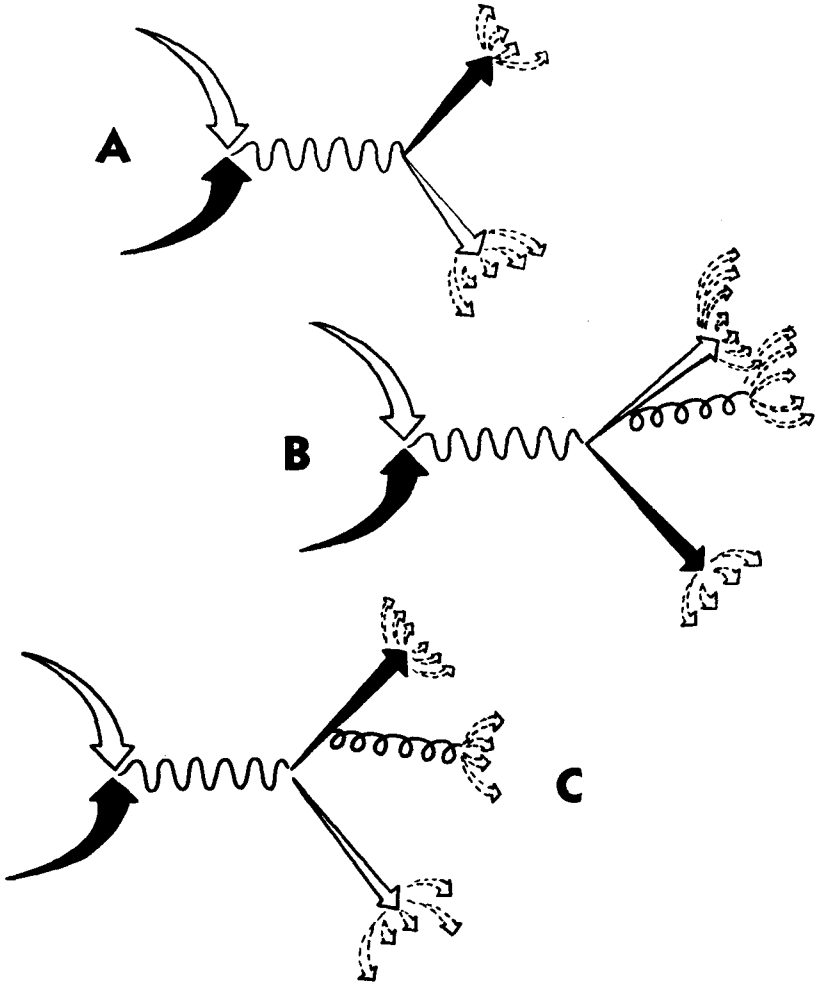

Above (a) is shown an event where matter (the white arrow) and antimatter (the black one) meet and annihilate each other in a burst of pure energy. A photon (the wavy line) is briefly created; it, in turn, creates another matter-antimatter pair, this time a quark and an antiquark (the black arrow). That this event ever took place is inferred from the end-products—all of which are relatives of the pion and which are shown as dotted arrows. In (b) is shown one variation on the theme (where, again, the antiparticles are the black arrows). A quark radiates a "gluon" (the spiraled line), but there is not enough energy there, in contrast to the event in (c), to allow production of three distinct jets.

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as mentioned above, quickly breaks up and makes pions, as did the quarks in our first Feynman diagram (**A**). That is, the gluon materializes as a group of recognizable (colorless) particles.

But if the intermediate gluon doesn't have very much energy, the particles it creates won't stray far from those of the parent quark, as is shown in (**B**). This situation, where the quark and gluon jets merge into one broad jet and one thin jet is left by the antiquark, is called "a squash racquet event" because that is what it rather looks like in the laboratory (but not in the Feynman diagram). With more energy, as in (**C**), the gluon's jet becomes distinct from that of the parent quark jets. This kind of three-jet event is called a "Mercedes" event because, again in the lab, it resembles that famous German hood ornament.

The relative production rate for these three-jet events provides a direct measure of what is known as "the strong coupling constant"—that is, a number which says how strongly the gluons interact with quarks. Experimentally it is found that this number—as quantum chromodynamics says it ought—increases as the distance the gluon goes between quarks increases. This is quite different from the analogous quantity in quantum electrodynamics, which has always been found to be the same small dimensionless number, 1/137.

If quantum chromodynamics truly describes matter, then it ought to give rise to a new class of "particle" made from gluons alone. Such a state is usually called by the picturesque name of "glueball."* A glueball is a color-neutral, quarkless piece of matter. It can be visualized as an interacting bound system of two, three, or more gluons.

These peculiar "balls" were first postulated in 1972, but it was not until three years later that anyone began to take the speculation seriously. Such an object is expected to be somewhat more stable than a pion (or one of its brethren) of the same mass. Of course, the question of masses of glueballs is not at all a settled one, though the higher the mass, the more unstable the glueball.

If glueballs exist, however, they exist only because of peculiar properties of the nether-nether quantum world. Sidney Coleman of Harvard University tried unsuccessfully to "create" a glueball mathematically in the case when the color forces were described by the laws of classical (non-quantum) physics. One can show that there is no classical, electromagnetic analog for such an object. Using quantum electrodynamics, one can never come up with a ball of photons, since in that theory photons don't interact with one another directly, but only by intermediate states involving point-like particles. A direct gluon-gluon-gluon interaction is, however, a vital

**When this name was first submitted to* Physical Review Letters, *the editors raised a hue and cry as to its appropriateness for "a family journal." Another choice, "oddballs," indicating characteristics not usually allowed for a quark-antiquark state, the editors simply scratched out without comment. Looking for "oddballs," however, would be a rather good way to pinpoint "ordinary" glueballs.*

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ingredient of quantum chromodynamics.

A natural hunting ground for a glueball is said to be in the decay products of certain of the pion's kin which bear "hidden charm," an arcane concept that goes far afield of our present story. But on the basis of some three million decays observed with the Mark II and Crystal Ball detectors at Stanford, a number of physicists claim that a glueball has already been seen. Among them are John Donoghue of the University of Massachusetts, Kenneth Johnson, Bing An Li from Stanford, and, independently, Michael Chanowitz of Lawrence Berkeley Laboratory.

Not everyone, however, agrees. One group points out that the data could equally as well be interpreted in the usual way as a bound state of a quark-antiquark pair. Those supporting this more conventional interpretation include Sydney Meshkov and Joseph Coyne of the National Bureau of Standards, Paul Fishbane of the University of Virginia, and Carl Carlson and Franz Gross, both of whom are at the College of William and Mary. This is an impasse which can only be resolved by future experimental data.

The accumulation of more evidence for gluons (or glueballs) is desired because, as might be expected, not everyone has jumped on "the QCD bandwagon." One disbeliever publicly avowed he can't distinguish the redeeming features of quantum chromodynamics from those of "a black hole." But, as another was quoted in the public press: "Once you've got 'em by the glueballs, their hearts and minds will follow."

Adopting the viewpoint of the quantum chromodynamicists, the fact that the ordinary atomic nucleus exists at all as a collection of protons and neutrons is simply "an accident of density." If the nucleus—which is mostly empty space—could somehow be squeezed enough, then its individual neutrons and protons would lose their separate identities and the nucleus would degenerate into a soup of quarks.* Thus the "socially approved" way to truly understand the complicated behavior of protons and neutrons and pions is in terms of their more fundamental constituents, the quarks and gluons. To a large extent, however, it is still a question of taste as to how one proceeds in a given calculation of nuclear properties—the new quark picture is not always as practical as "the old way." One is reminded at this point of Stephen Crane's man who protested to God, "But, Sir, I *exist!*" "That," went the reply, "creates no sense of obligation in Me."

Quarks and gluons—and perhaps even glueballs—all seem to exist, albeit not in an unconfined state. We finally may have come to the end of the 2,000-year-old search for the ultimate constituents of matter. Further substructure for quarks (and the other "pointlike" particles such as electrons) has been ruled out by arguments based on the formidable restrictions imposed by quantum mechanics and the theory of relativity. A still more germane argument is perhaps that

**Such behavior may, in fact, take place in the deep interiors of neutron stars.*

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which asks, "why bother looking for sub-parts of a quark, if the quark itself can never be directly seen?"

This does not mean, however, that our picture of Nature is either as simple or elegant as was Boscovich's (though, of course, his theory didn't have to take into account experimental data). While the atomic analogy apparently cannot be more deeply applied than in the elaborate theory which is quantum chromodynamics, complication upon complication has emerged in what might be called "a sideways fashion." Once there were three quarks (together with three antiquarks). Now, there are said to be six, all but one of which has been (indirectly) observed. Each of these six quarks (and antiquarks) comes in three colors. These are bound by eight colored gluons, which can also form matter as "balls." The brethren of the electron is also a growing horde, now numbering six. This leads one to wonder: "Can this really be right?" Or is matter still more subtle than we have so far been able to imagine? ■

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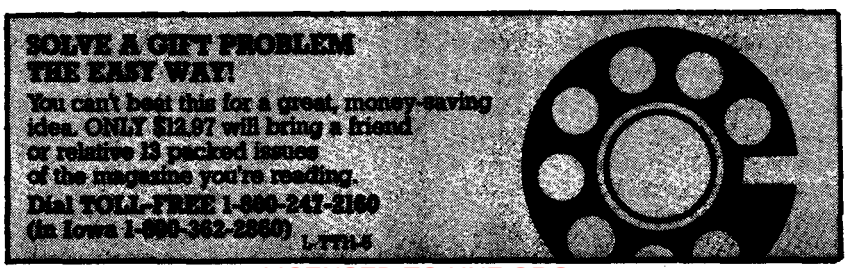
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Jay Kay Klein's biolog

When Margaret L. Silbar started out as a newspaperperson, a ring of copy editors threatened to quit if a woman were allowed to write a headline. At another paper she—as a woman—was deemed incapable of untangling complicated football plays. Now as a science writer she routinely lays bare the mysteries of particle physics, x-ray astronomy, and artificial intelligence. Operating at the boundary of the known and unknown, her first *Analog* article in the February 1967 issue was about the hunting of the Quark. Editor John Campbell was so taken by this high-power sporting event that he tracked her down in Istanbul with some questions even Murray Gell-Mann couldn't answer at the time. (These are finally answered in this issue's article on gluons and glueballs.)

She was born in a spare bedroom of a rambling farmhouse in Big Rapids, Michigan, at the same time and place where one of the housecats was giving birth. Promptly dubbed Maggie, as pick of the litter she was first taught her letters off the spines of the *Century Dictionary and Cyclopedia* at age three, then some years later sent to the University of Michigan to acquire a dual degree in journalism and English. Physics became a life-long passion, leading to a science writing career and meeting her husband, who is a Ph.D. researcher in medium energy physics at Los Alamos.

Since leaving the farm, Maggie has indulged a passion for travelling, having lived in Switzerland, Moscow, and Mexico City, as well as visiting such places as far apart as Paris and Machu Picchu. Speaking French, Spanish, German, and Russian has proved helpful, as may be expected when riding the Orient Express (second class) from Vienna to Istanbul.

Self-tutored in the wider mysteries of the universe, Maggie has a distrust of "credentialism" shared by editor Stan Schmidt and many readers of *Analog*. She has learned that it's usually the second-rate scientists who do verbal footshuffling when asked for explanations, saying their work can't be understood and, anyway, they're too busy to try. She has written for *Mosaic, The Griffith Observer, Science Digest*, and in collaboration for the *CERN Courier* and *Los Alamos Science*.

On a year's temporary stay near Washington, Maggie is putting together entertainment software with a scientific slant for users of home computers who would like to do more than play games. ■

Margaret L. Silbar

Photo: by Ro Jay Photographers

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Rick Wilber

WAITING FOR THE CALL

Obviously, deliberate First Contact ought to be a Momentous Occasion, involving heads of state and the very best minds of a species. Or should it?

I am not insane, and I did not murder my best friend. Insanity would, I know, answer a lot of questions you'll be raising later, and would make this whole story more believable right from the start. But it just isn't so. What I say happened really *did* happen to Ronnie, I'm sure of it. I've told the same story to the police any number of times now, and maybe they don't totally believe me, but I'm not in jail either, am I? I tell you like I told them. Ronnie just disappeared.

He did have a reason, that's what I'm going to tell you about. He had what he called a Real Opportunity. And the offer was one he just couldn't resist.

He told me about it two weeks ago at a place called Our Tavern, a typical wood-with-posters sort of college bar in the town where we both live and I teach.

"I've been offered a really odd sort of opportunity," he told me over a pitcher of beer. "I mean, it's very, very different."

He looked at me over his glasses as he spoke. He had this habit of letting his glasses slip down on his nose so he could see over them but still use them to read if he needed them. It was the sort of habit he'd picked up when he'd been teaching. That was how I met him. I teach English; he taught physics, until the salary got to him and he left for the local aerospace firm. It was a long commute, but he drove to the city and lived in our town for the atmosphere and the relatively lower cost of living.

Talking over the top of his glasses, still sweating from the three-mile run he'd made before meeting me at Our Tavern, he tried to break it to me easily.

"It's an opportunity, Paul," he told me, "to do some very heavy-duty traveling." And I nodded my head because I knew he liked to travel.

"And," he added, looking at me a little harder, "I can really put my physics to use." And I nodded at that, too. He'd been very worried about his physics, even when he'd been teaching.

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Ronnie was just thirty-three, but that was far over the hill to him. All the great minds in his field, he kept telling me, had done their really creative work in their twenties and spent the rest of their lives refining it. Thirty-three, he told me, was out-to-pasture time. At thirty-five, that made me feel all the worse.

"These people," he told me, "need somebody just like me. Somebody so much like me I sort of scare them because I fit their profile so well." I nodded sagely again, then stopped in mid-nod.

"Profile?"

"Look, Paul. These guys are really big-time. They're . . . " He stopped in the middle of the thought and looked at me closely. "Paul," he said. "You're my closest friend. I want to tell you something in strictest confidence. Something you'll never tell anyone, anytime. All right?"

As you can see, I said all right.

"Paul," he said, leaning over the table to get close to me, dipping the sleeve of his sweat-stained jersey into the puddle of beer on the table, "they're aliens."

I nodded sagely.

"That's all you can do? Just nod your head?" He sat back in disbelief.

I sort of half-smiled. There is, I was discovering, no good way to receive news like that. Especially in a crowded bar in a college town. Especially after a few beers, with more to come. And especially when you don't know whether you're supposed to laugh or not.

"Aliens?"

"They talk to me when I run," he said, as if that explained anything.

"Talk to you when you run?"

"When I run." He said it firmly, truthfully.

"When you run." I said it equally firmly, with the truth part in question.

"Look, Paul. When I run I reach this sort of state of revery, when my mind just starts to drift off, to unhinge."

"I've always said that about you runners. Your minds unhinge."

He ignored me.

"It happens to a lot of people. What happens is that you sort of drift along. The running stops hurting for a while, and you just drift. Revery."

"Revery."

"Right. Well, I was in that state of mind, very relaxed, when I heard a voice calling my name, very gently, but as if from a distance. I looked around as I ran but couldn't see anyone, but I almost stopped anyway to check it out. Something made me keep on running. After a minute or so, back on the trail, I heard the voice again, closer this time, just saying my name very clearly now, just the first name. 'Ronnie,' it said, 'Ronnie,' and then it faded away."

I was glad at that point that I hadn't laughed.

"That part of the trail, the part near the campus, is a long gentle downslope, almost a mile and a half of downhill, so I was really cruising easily as I listened for the voice again. Frankly, I didn't know whether I wanted to hear it again or not."

He sat back in his chair and took a deep breath, then leaned forward again.

"I didn't hear any more voices that time, Paul, but a very strange thing happened."

"You went out and conquered France for Christ."

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He missed the allusion.

"There's that big hill, the tough one, that runs from the soccer field up to the physics buildings. A good half-mile of steep uphill."

"I know it," I said. "I cycle up it every day. It's a bitch."

"You ought to try running it," he said. "Especially when you've already run a couple of miles in front of it. It's a killer. I always have a hard time with it.

"But that day, for some reason, I felt really good at the bottom of it and just sailed up it. I felt like I was going downhill instead of up. It was that easy."

"So?"

"Paul, it felt like something was pushing me, making it all very easy, showing me a new way up that hill, or maybe a new attitude toward conquering it."

I left at that point to buy another pitcher, and when I came back Teetee was talking to Ronnie. Teetee, nicknamed after initials which carved their way across her chest on almost everything she wore, was an old student of Ronnie's who had been trying to hit on him ever since. Her luck this night was no better than any other. I took up my seat as she walked disconsolately away.

"You sure break a lot of hearts," I said.

"It was like something really wanted to talk to me, but hadn't quite gotten through," he said, ignoring anything other than his treatise on aliens and first contact. "So I thought about it, and decided to run again that night and give them another chance."

I shook my head this time, in pity. Ronnie's a runner and his physique shows it. But twice in one day was too much even for him, and I told him so.

"But I had to give them a chance to get through," he said. "And it worked."

I had decided by this time that he was dead serious about this, and also decided that he seemed surprisingly lucid about it, despite the subject matter, so I listened patiently while he explained how he had gone back out on the trail, in the dark, moonless night, to try to recapture the feeling that had allowed that voice to reach him.

"The first part of the trail is open to the sky, you know," he said, "so visibility there wasn't too bad. Just the lights from the town reflecting off the clouds helped. In fact, as I ran I noticed how much more beautiful that old trail was by night. The scruffy underbrush that lines the side of the trail took on a kind of air of mystery, and the night air, stirred up by low clouds that were heading my way, had a kind of chilly bite to it that I hadn't felt in a long time. The whole experience at that point was very, well, *refreshing* describes it best. It was like I hadn't done it all before, as if it was all brand new. I liked it.

"But then I hit the part where these big oaks and maples line the trail, the part at the edge of campus. And they throw a canopy over the top of the trail that kept out most of the light. I was pumping pretty hard by then, harder than I should have been, not pacing myself at all, just trying to reach that revery, when I started feeling this sense of detachment.

"I looked down, and the deep shade from the trees hid everything from the waist down. I couldn't see my legs at all; it was like they weren't even there.

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My legs were doing all this work strictly on their own and the top half of me was just along for the ride, floating above this layer of darkness that hid the bottom of me. And then my breathing started to level out to almost nothing; all the gasping and sucking for air was suddenly completely relieved."

"And you heard the voice," I broke in, trying to bring him back to reality a little. As he was telling me the story he had begun to drift right back to that trail, it seemed. I liked him better firmly grounded, legs and all, at Our Tavern.

"Yeah," he said, coming back a little. "I did. Deep inside me, like a whisper but loud enough to be perfectly clear. And it was calling my name again. Just that, just 'Ronnie, Ronnie,' into the night while I ran that darkened trail."

"Is that all it said, just your name?"

"Paul, this is the hardest part of all to explain. While I ran I could hear the voice just calling out my name, whispering it to me. But I could feel, intuitively, what it wanted me to know. It never said anything to me other than my name, you understand? And it said that in a really flat tone, no accent, no intonation. Just flat.

"But as it said my name I could begin to 'feel' what it wanted me to know. And I could feel it while I was running, running just as easily as I had the first time up the hill during the day. I was just cruising along, hearing it call my name, and picking up all this information. Fresh information, knowledge I'm sure I'd never had before. Knowledge as fresh to me as the trail seemed that night."

"What kind of knowledge, Ronnie?"

"What it was that was happening to me, for beginners. And what they wanted from me after that. And then, sort of, well, miracles."

I got up to leave at that point. Ronnie was drinking a lot, it seemed to me, and embellishing a story that I had just begun to believe until he dropped in the miracles line. I pushed my chair back and got halfway to the door before he caught up to me.

"Paul," he said, pulling me back. "Don't walk out on this. I want you to hear it."

"I've got to get outside for a while, Ronnie, OK? Just for some fresh air." That was a warning we two had built up over the years of friendship. When one of us wanted to be alone he claimed the need for fresh air and the other left him alone. It was that simple. And I needed the fresh air.

But Ronnie followed me outside, and hung on to my arm as I rounded the corner of the building and headed for the parking lot.

"Paul," he said. "Listen, OK, I used the wrong word. Not 'miracles,' not in the sense you're thinking. More like answers. Answers to things I've wondered about since high school. And answers to things I didn't even know enough to wonder about. Things our best minds don't even begin to fathom yet."

"Physics?"

"Cosmology, Paul. I began to understand how it all works. How they could reach me from another star, and how my own body could do things I'd never thought a body could do, and how my body fit into the order of things.

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How I fit in, how you fit in, how it all fits together. How to bring order out of the chaos."

"Shit, Ronnie. Bring it back down here, will you?" I reached down, getting on one knee, and patted the earth.

"Look, Paul. I didn't begin to understand what was going on at first. But as I ran it slowly fit together. And as long as I kept running, pacing myself at a rate I never try to get to, the information kept pouring in. I finally had to stop—not because I was tired but because I couldn't handle any more information. I was full, like filling a file on one of those computer typesetters that you guys use to put out that literary magazine."

"And when you stopped running?"

"It stopped coming in. It just stopped completely, like turning off a switch."

"When did this happen, Ronnie?"

"*Two weeks ago, tonight.*"

I realized that we were walking at a brisk pace, the two of us, well past the parking lots, heading through the town. It seemed as good a way as any to carry on a conversation of this sort.

"OK, Ronnie. Let's say I buy all this. Let's say it really happened. What I want to know is, why? Why have these things from out there bothered to call you on the cosmic hotline to carry on a conversation?"

"That's the best part, Paul. They want me to come to their home, to visit them, to share what I can tell them about the science of Earth."

"You?"

"Paul, they searched for years to find me. The connection only works under the right conditions, and only with the right people. And from those contacts they had to pick one that was somebody they could learn from."

"And they can learn from you?"

"I'm a physicist, remember? I know about as much about our science as you do about our literature, all right?"

He had me there. He was a good physicist; his peers told me so. Not a great one, perhaps, but a good one. Until the salary crunch on campus had hit him too hard, he'd been a good teacher too.

I looked up as we stopped. Ronnie had known what he was doing. We had walked to the start of the trail. We were in the darkness on the edge of town, facing the trail that led off into the underbrush. The trail where Ronnie ran every day, and now most nights too.

I knew why we were there, and didn't question him at all when we started walking along it. We had about a mile to walk to reach the part where the big oaks made the trail a tunnel with their leafy overhang. He talked as he walked toward that spot.

"They want me to come, Paul, and I'm going to do it. They've given me just enough information to prove how far along they are, and how much I can learn from them. And I have to go."

I could understand, I suppose, his willingness. He was, after all, a physicist who had been convinced that his world had passed him by. And now the greatest chance of them all had been dropped into his lap. A chance to go as far past Einstein as Apollo 11 was past the *Santa Maria*.

"How are they coming for you, Ronnie?" I was afraid to say more. A big silver spaceship, with a giant robot walking out from it? A round globe of bright, shining lights and happy little

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munchkins dancing around him? I wondered.

"They don't do it like you're thinking, Paul. It doesn't work like that. They don't come for me; I go to them."

I mulled that over as we walked. The whole thing was a lot stranger than anything I had bargained for when Ronnie had called and said, "Let's go get a beer." I'd wondered briefly at the time why he'd done that; he usually didn't during the week. Now, as we walked along, it dawned on me that he'd planned most of this right from the start. And I had come along like a perfectly led lamb, which told me something about myself.

We walked along, the two of us, for a few more minutes while I thought things over, and then, when I looked up, we were there, at the edge of the tunnel-like section of the darkened trail.

"C'mon," Ronnie said to me, and started trotting. He had on his shoes and sweats from the run he'd made before we'd met for the beer. I had on loafers, shorts, and a T-shirt, but that would just have to do. I followed him.

I am not a runner, understand. I can go a mile or two when I feel the need, because I stay in shape cycling and working out on the basketball court. But running, frankly, always bored me. I couldn't stand the boredom and the lack of winning and losing. I'm just that sort.

But that night, given the conditions of the run, avoiding boredom was not difficult at all. The trail was as mysteriously beautiful as Ronnie had said it was, and the full moon that now hovered above us threw just enough light through the overhanging leaves to show me the way. Ronnie didn't seem to look down at all as he ran. I suppose his feet had memorized the way on their own by that time.

As we ran he slowly increased the pace, and I sought to keep up. A part of me wanted to reach that revery and hear my own voices in the night. But another part was concerned just with keeping up with him and keeping a clear head. No revery meant no voices and a large part of my conscious mind didn't want anything to do with whispers in the night, thank you.

And then, as we ran, I noticed an easing of the burden of the run. My breathing cut back from a hard suck to an easy draw through the nose. My heart stopped pounding so hard and settled back into an easier rhythm, matching my footfalls two for one. Every time my right foot hit the trail my heart pumped that load of blood around the racecourse of veins and arteries, keeping the whole thing working. It was a nice comfortable pace.

A pace I had no right to be reaching, I suddenly realized. And I looked up to see that Ronnie was now beside me, and watching me as he cruised along, a half smile—a quizzical smile—on his face.

"Feel it?"

I nodded. I *did* feel it; I felt the help I was getting from somewhere. But I didn't hear anything, not yet. And I wasn't at all sure I really wanted to.

We hit the end of the canopied section and entered the outer service road to the physics building. Following that for a few hundred yards, we hit the hill, the bitch, and started up it.

. . . or floated up it. That's the only way to describe what happened. I'm not

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sure my feet really touched the ground. I just drifted up that hill like it was a flat plain of ice and I was skating along it. Effortlessly I moved up it, right to the top, with Ronnie, grinning openly now, at my side. And so together we reached the top of the hill, and stopped.

There was no labored breathing to catch back up with oxygen demands. No pounding heart trying to force the new oxygen around the racecourse. We just stood there for a second and appreciated the view from the top of the hill. The town, its lights aglow, was spread out below us, and on each side of us stood the woods, with a small clearing off to the right where an old family burial plot remained, put there long before our university had taken over the land. A lone marker, a five-foot-high stone tablet, adorned the plot. Ronnie started walking toward it. I followed.

"I leave tonight, Paul," he said. "I brought you along so someone would know where I'm going and when I'll be back."

"Where?" I said. "When?"

"It's the fourth planet from a binary system beyond the Horsehead nebula," he said. "And I'm not sure when. When I'm ready, they say. And that may be months or years. But they promise that I'll be back."

"And you trust them?"

"I have to," he said, and he raised his arms to the stars.

I didn't know what to expect, but there was nothing very dramatic. No angelic hordes to carry him off, no flashing ships or silvery shapes or strange tongues. He said a few more words as he waited, and then he was just there one moment and gone the next. That was that.

But before he left he told me one more thing. Something I didn't tell the police. He told me they were looking for someone else, another person, someone who could tell them about the arts on this planet, about our literature and our painting and our emotional expressions of ourselves. Mainly, he said, about our written language and how we use it for artistic expression. "Bone up on it," he told me with a grin, just before he vanished.

And I have, for weeks now. The police finally left me alone, since they had no proof of anything. Since then I've been rereading the classics and I'm working on the contemporary writers at the same time. I want to be ready. Ronnie said he'd put in a good word for me. I'm getting up every morning and hitting the books, reading right through the day. And then, as you might expect, comes the night, and that's when I run. Through the trail, through the canopied section of the trees, waiting for the call, waiting to hear my name whispered to me in the night. Calling me, calling me. ■

● The heaven and the earth have become terribly alike since Einstein. No longer can we find a reassuring contrast to chaos in the night sky... Order is not there.

E. M. Forster

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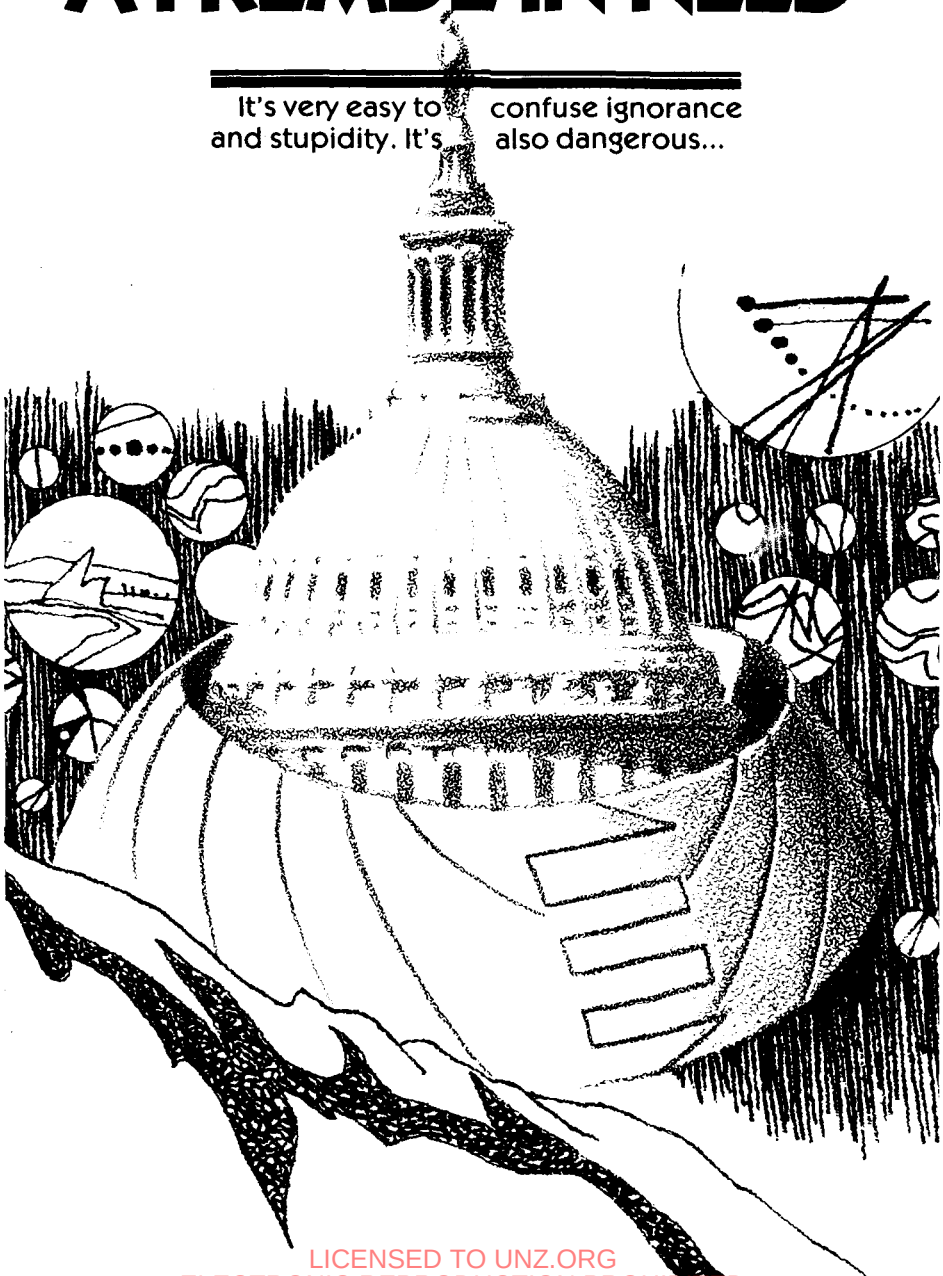
Joseph H. Delaney

A FREMDE IN NEED

It's very easy to confuse ignorance and stupidity. It's also dangerous...



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Patán was so excited he couldn't wait for the computer to park his little craft. The computer, of course, would do it with maximum fuel savings, but it would take forever. Patán overrode it, squandering reaction mass with reckless abandon. No matter. There was lots more down there on the planet. The natives were sure to have plenty, and just as surely they would be willing to sell him all he wanted once they'd seen what he had to trade.

Days ago, during a random drop out of subspace, he'd picked up the feeble signals which caused him to change course and come here: signals with an unmistakable pattern, one that could only mean intelligent life—though not, of course, on a parallel with the level of the Fremde. It was sheer luck; certainly nothing else could account for it. Purely the product of a split-second delay in timing that brought his ship into virgin space for a position check, that otherwise would simply have been a burp in the astrogation computer's routine and would have gone unnoticed.

Fast as it was, the computer needed a few seconds to scan, calculate the difference, then correct for the error of several parsecs the delay had caused. And that was when Patán, who had been lounging in the control room for lack of anything better to do, had noticed the needles of several instruments twitch and jiggle. Investigation had led him to this.

"Riches," he told himself. "Yours in youth. No need to wait until you are old, when finally you've struggled to the top in the old-fashioned way."

Until this instant that had been his future: to start as a mere drummer, peddling goods on league planets, fattening those above with his labors, until he could save enough from his commissions to buy into one of the companies.

Things would be different now: with a whole planet, a whole civilization, to pluck all for his very own, he didn't need them. Now he could get the financial backing he'd need to exploit it; now he had collateral.

That is, he would have as soon as he'd completed a survey from low orbit and stored in his data banks the sum total of the knowledge his sensors could suck out of it. He thought of that and drooled. Minerals would be a start. They always were, particularly the fissionables. But the organics: they were the real jewels. They and the cleverly fashioned artifacts, the paintings and statuary so esteemed by wealthy collectors, some of whom would trade all else they owned for one strange object shaped by alien hands.

Patán himself was a more practical being. Such things didn't impress him for their own sakes, but only for what they could help him acquire for his own.

Below him the planet loomed, blue-green and streaked with clouds. He could hardly take his eyes off it to check his instruments. Signals he had intercepted told him what the natives looked like, of course, and how they sounded, too. His early estimate of cultural level appeared to be accurate. With so many obviously major languages in use they must be politically fragmented too, and that made this world a trader's dream. Nothing like playing off one yokel prince against another.

Fortunately his ship had equipment which enabled him to pick up these sig-

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nals and to convert them to sounds and images his own screens and speakers could display. But more importantly, this capability had enabled him to get a start on translation. His language unit had, by now, identified over thirty different tongues, and made a good-sized dent in understanding each. When he returned after further refinement of what he had recorded, he and his future employees should be fluent in all of them.

He eased the ship into the orbit he wanted, circling the planet in a direction opposite its orbital motion and just brushing the upper fringes of its atmosphere. A careful check on the way in had convinced him these people probably didn't have any spaceflight capability, so he didn't worry about interception before his peaceful intentions could be demonstrated.

Too late, he realized that guess was wrong. He'd assumed his instrumentation would detect native craft of moderate size, and that assumption was no doubt correct. However, the ship had not been instructed to notice micrometeors this close to planetary surface, and that had been a mistake.

He didn't realize what hit him at the time. When it was too late the answer became clear: these people had indiscriminately filled their lowest orbits with junk, and although they didn't make any obvious, continuing use of these equatorial pathways, they evidently did have a rudimentary capability to launch artificial satellites.

And at twenty-three kilometers per second even the tiniest solid particles had massive punch; so much for his impatience in taking the quick and easy. The problem now was to breathe.

The ship now leaked air and fluids from dozens of tiny holes and left behind it a trail of vapor, a sure way to attract the attention of anyone watching. Patán hurriedly crawled into a space suit, knowing that although the ship would seal these breaches, the air pressure could drop to dangerous levels, and that further collisions could occur.

They did, though not so badly, and he knew he had to get out of the path of any more of them; get into a higher orbit, preferably in the other direction.

Too late for that, the flashing lights told him. His eyes fell on the mass gauge, where the indicator was rapidly descending. He cursed his own stupidity, which had placed him in this position. High orbit wouldn't help now. It would only get him trapped. He needed the mass he was losing to get out of the system, where he could use his inertial drive to return to civilized space and secure aid.

Down to the planet, then; use what mass remained for braking, plug the leaks, and get more. He knew it would be there, fortunately. He'd just have to revise his plans a little about first contact.

Right now, contact of any kind was undesirable and premature. He glanced below, spotted what looked like an arid, desolate area, and fired his retro rockets until they died from lack of expellable mass. As a consequence, his speed diminished, and the ship dropped like a stone through the thin layers, slowing only when his aerodynamic surfaces gained lift.

Patán then began a slow and tortuous spiral toward the surface, keeping an eye on his detectors. It was unlikely

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those creatures possessed any instruments capable of penetrating his shielding, but you never knew. He'd already guessed wrong once.

The ground neared. Below him he could see vast and trackless expanses of sparse vegetation, and little if any evidence that there was anything else there. He dropped the ship between two ranges of fair-sized mountains and circled in the valley between them, now low enough so that with his naked eyes he thought he would see buildings, roads and the like, if there were any. He saw none.

Ahead was what appeared to be a large floodplain, stark and bare, composed of some loose material. Below it, toward the planetary equator, was a river whose waters twisted and looped. One such loop enclosed the bare area.

Patán dropped his flaps and spoilers out full, felt a lurch, then pulled up his nose to flare. He was beginning to have second thoughts about this landing site. Despite its smoothness it didn't look all that firm. However, there was no going back up. Besides, the scrubby vegetation could, and probably did, conceal gulleys and boulders, and some of that was itself fairly large. He ruled out that diversion and went on to the next decision: belly in or risk the gear buckling.

Belly in was no doubt safer. Still, once down that way he didn't have the equipment to lift the ship and get the gear down for takeoff, nor, in the alternative, to take off on his tail jets. His hand reached for the button, pressed it. A whine ensued. Airspeed dropped still further. Patán gave his safety strap a hitch and made his upwind turn. Mistake number two was now a fact.

Patán knew that when he felt the slap of the gear binding into the soft surface, which threw the nose wheel down violently and suddenly. It immediately bound and collapsed, dumping him forward into the instrument panels.

His face plate cracked, but his skull survived. For an instant the ship stood poised, its stern pointed skyward, as it skidded ever closer to the edge of the flat. With incredible luck it managed this small stability and for long, agonizing moments it careened, its skin screeching from the friction with the ground. When at last it stopped, Patán sat stock still, reflecting on the possibility of ever getting it off the ground again.

He released his harness, climbed out of the suit, and went outside to survey the damage. It was bad, worse than he'd ever imagined. There was nothing to do but get to work and try to conceal the ship from prying eyes. He went about it reluctantly but with resignation.

Without massive native help or heavy equipment he'd never get it up. And to get either he'd have to risk a foray into the populated areas of the planet. That he could do, with proper disguise and discreet behavior, but there was no telling how long it would take.

Cecilio Ruiz hated horses. Horses stank. They were uncomfortable to ride, and you never could tell what they might do, especially if they sensed you feared them. Somehow they had this ability, stupid as they were in most other ways.

He sat on the big copper sorrel and looked off in the distance, where he saw nothing to indicate the presence of the coyote or his charges, grateful that his

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mount was a comparatively gentle gelding, instead of a spirited stallion.

Cecilio knew why he was here, suffering in the boonies, instead of on the comparatively easy day shift back at Sarita Checkpoint. The regional supervisor had told him in no uncertain terms that he'd been a bad boy, that he had a choice. He could get out of sight and take a harsh frontier station or leave the Border Patrol.

"Politics, Ruiz? Sure it's politics. I have to live with politicians. My boss has to live with politicians. Politicians run this country. Did you guys forget that for a minute—huh?"

Cecilio didn't answer. He didn't have to. He wasn't expected to. And the chief would have taken it as insubordinate if he'd tried. Despite the fact that he probably agreed basically with Ruiz's viewpoint and would have done the same things in his place.

Anderson, Ruiz's partner, had left the patrol, but then he had a good education and wouldn't have any trouble finding employment in private industry. Anderson had left him to take the whole brunt of the investigation alone, and Anderson had been the one who'd planted the hippie kid in the first place, just before they were to close down for the shift.

They'd already made two busts that day: two mules with about three hundred pounds of weed between them, so it wasn't like they needed another one for the record. But the kid had smarted off when Anderson checked his citizenship, told Anderson he was a Martian; and Anderson blew up, yanked him out of the car and took him inside, resolved to search the car down to its frame and find something.

Anderson did a good job. When he finished, the car was a mess, but he'd guessed wrong and found nothing. No matter; a pinch or two of what they'd already seized, packed in a baggie, and the D.A. would do the rest—he thought.

But at the time he didn't know the kid had just gotten out of the Kennedy County Jail, that the sheriff had been all over the car with dogs, and that one of their own roving patrols had been behind him almost all the way between there and the checkpoint. And that was the least of it. It turned out the kid's father was the publisher of a national news magazine in New York; just the kind of spot to make real waves. And he did.

That was why Cecilio was out here in the Big Bend, chasing wetbacks through the night, in country where only a man on foot or horseback could travel.

There was a blast of static on the radio which hung from a strap on the saddle horn. "Ruiz?"

"Yeah—I'm here."

"Coming at you, if you're where we think you are. A bunch of the sensors just tripped over in Santa Elena Canyon. That'd be northwest of you, and it's a long way, but you're closer than Peterson is. Round them up. They're all yours."

"Right. On my way." He gave his horse a touch of the spur and started off at a walk. Cecilio wasn't about to go any faster. If his horse stumbled and threw him nobody would find him for weeks.

Pussifor Jones was twenty-eight,

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black, and poor. He didn't like that. Pussifor didn't think it was fair, and never had thought so. Not from the moment he'd been old enough to realize that the world didn't end when you left Harlem.

The older he got, the more he realized there were things in the world that he wanted and that he didn't have, but which other people did. He could see that the pimps and the pushers had big cars, fancy clothes, and pockets full of money. They had teeth inlaid with gold and diamonds, and squired fancy ladies, all decked out in more of the same.

And they weren't the only ones, either. Over in Spanish Harlem things were just the same. Only the language was different. So Pussifor went to school in the streets, absorbing its broad, practical curriculum and taking any course it offered. By the time he was nine he could roll a drunk and pick a pocket. He could go into a store skinny and come out fat, and then outrun anybody who wanted to chase him. By twelve he was an accomplished mugger, burglar, and car thief. By fifteen he'd branched out, found friends among the Puerto Ricans, and started dealing a little dope. That was when he'd learned Spanish.

Naturally, education means tuition. He paid that too, every time he demonstrated failure to learn the lesson well enough. But each time a friendly judge turned him over to sympathetic juvenile officers, just oozing human kindness for all they were worth. Pussifor learned diplomacy from that. He considered the ability to snow a social worker to be the epitomy of art forms, and himself a virtuoso.

Time passed. So did the magic number, seventeen. School was out, but for a while after that Pussifor's luck held, and he was busily carving himself out a niche in the numbers racket when his luck ran out too—almost.

Faced with his first adult arrest, Pussifor was somewhat abashed that it was for gambling. He'd done lots of things worse than that, things that had made him a big dude on the street. A gambling bust would cost him. That was a sign of stupidity. Of course, it had its good points, too. There was money for a lawyer. Good old Sidney, the boss's brother-in-law. He'd take care of everything: call in a marker, get a probated sentence. Meanwhile, Pussifor could stay off the street and do something else for the organization.

But the D.A. wouldn't deal. He wanted hard time. Because while Pussifor's juvenile record wasn't admissible, the police knew all about him, and they knew Pussifor was a smart boy destined for bigger things. So Sidney couldn't cop him out. They went to trial and Pussifor lost. Sidney was family, but he was not all that hot otherwise.

Pussifor fired him, and the court appointed the public defender to handle the punishment phase. And the P.D., it seemed, had friends: recruiters. There was still an angle to work. Uncle Sam wanted him, Pussifor Jones, because the Army needed bodies and Pussifor had one. A bargain was struck.

Strangely enough, he liked it. He got along well because, here again, it was a kind of a school. He soaked it up: got the basics and even made it into special forces. That was even greater. By the time training was over, Pussifor could

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have licked any ten civilians on Earth and lived on what forage there was to be found on the moon. He was rough, tough, and still poor.

So, finding himself in a state of pecuniary embarrassment one night in an Atlanta bar, he reverted to an old habit. But finesse had left him. Inactivity had left his talents dull. And despite an obviously large amount of strong drink, the senses of the victim were still intact. He clung to his wallet with ferocious determination, and Pussifor hit him, only to fall victim himself, seconds later, to the sap of the bar's bouncer.

So for Pussifor it was a year in the stockade and a dishonorable discharge. He emerged from this experience with even less in his pockets, but with the germ of an idea. That winter found Pussifor in business for himself: a business for which he had been thoroughly and superbly trained. And it paid both ways: wetbacks from Chihuahua to Texas, guns from Texas back to Chihuahua, and all with less risk than rolling drunks.

He huddled in the darkness, waiting on this moonless night, for the signs of his charges. They would be frightened and noisy, probably wet and miserable, too. Perales, his opposite number across the river, was a cowardly sort, who frequently gave them only the most rudimentary directions, and more often than not would steer them toward the deepest part of the river, for his own amusement.

The money came by courier, well in advance of each trip, and was always safe on deposit at Pussifor's bank in Presidio before he moved a muscle. That way, no one ever had the temptation to hit him from behind at the end of the trip and get his hard-earned rewards away from him.

As a coyote, Pussifor was a cut above the rest. He was proud of that. He never robbed the people or molested the women, as others did. He didn't think that was good for business. As it was, he could command much higher prices than the competition, so it was worth it. Besides, these people had little worth stealing and the women usually stank after a few days on the trail.

His finely tuned ears detected a sound: a loud one. Sensors. The people were stumbling over them right and left. That did make it difficult, as each sensor, when disturbed, emitted a radio signal on frequencies monitored by the Border Patrol. Of course, these also could be disturbed by animals, but the patrol would investigate anyway. They wouldn't make any assumptions. Sometimes the patrol had prior knowledge of a crossing from spies on the Mexican side. Pussifor paid his own people to check these things; still, you never knew. He believed in being careful.

Then he saw them. In the lead was a big man with an enormous sombrero on his head and a rough wool poncho across his broad shoulders. Behind him the others meekly followed. Pussifor counted twenty-three in all: a bigger group than he really liked to handle, but still two less than he'd been paid for.

After watching for a while, he made contact. It never paid to rush things, and although Pussifor felt fully competent to handle any wolves the Federales might have hidden among the sheep, he also had confidence in his own ability to spot them.

He spoke briefly to them in Spanish,

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learned two women had become ill and had been left behind, then got his party into marching order by reciting his own rules of the trek. He knew where all the sensors were, he told them. They would follow him in single file; they would keep up. They would be alert for his signal which, when given, would find them motionless on the ground. They would not speak. Anyone on horseback was an enemy who meant to kill them.

Pussifor was gruff. He intended to scare these people into submission, to convince them that he would abandon any who didn't obey him. Actually, he knew that the greatest danger would come in the morning, when the air patrols came out. At night, considering the rough ground and its vast emptiness, there was little to fear.

They started out, moving laterally along the river into the area of soft sand dropped by the occasional floods, which created temporary oxbow lakes. There would be no sensors in the sand, and lateral movement would take them around pursuit. The patrol's limited manpower dictated that they assume the wetbacks would go straight north right after crossing. Pussifor knew this. He also knew that, once satisfied their quarry was away from the river, the patrol would abandon any local pursuit and concentrate on choke points near main roads.

Pussifor didn't get into that. His job was to get them through the rough country and to make contacts with other coyotes who specialized in running checkpoints.

Patán sat in the control room of his concealed ship and watched his scanner produce tiny white blips on its screen. He was reasonably sure these were not made by animals, but until they came within range of his optical and acoustical instruments there was no way to be certain. If they were natives they could be searching for him, in which case he could very well be in trouble. He knew that his efforts to hide the ship were far from perfect, despite the fact he'd worked hard at it for three days.

Carefully he counted the blips. Twenty-three of them. No, twenty-four. One had been straggling. They moved with purpose, not randomly, as one might expect animals to do.

The range closed and Patán flicked on his infrared scanners. Slowly he traversed a circle around his position: nothing. He raised the angle and set it to rotate slowly, watching the screen carefully for signs. In a few moments he picked up an image: a huge one, far larger than any native. This had to be an animal.

For a while he watched it move steadily from right to left, relieved that it seemed to be getting no nearer. Then his attention was diverted; the microphones were beginning to pick up sounds much nearer to him. He grasped the IR controls and scanned the area to his immediate right, found the images which matched the blips in pattern, and watched them.

One figure led the others; they in turn seemed to be following it at a substantial distance, and this one alone was moving. The others waited motionless to its rear. Suddenly there was a curious sound from the amplifier, shrill, but low in volume. Patán didn't know what it was, but it had an effect on the figures. They immediately moved toward the leader.

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Then the speakers erupted into a flow of words in one of the native languages. Patán routed the sounds through his computer, which translated about half of what went into it. The rest came out as gaps in the stream of Fremde words. None of it made sense to Patán, but it did confirm his belief that this bunch was natives, not animals.

Listening intently, Patán formed an opinion about the context. The word for "pursuit" had popped up two or three times. But pursuit of whom, by whom? Patán gained the impression that this group was the object of the chase instead of himself, but if that was so, who was after them? Could it be the big animal?

He punched up a broader display on his echo sounder, scanned briefly, and picked up the image of the big animal. Matching the vector to that of his IR scanner, he found the echo for that and studied it a while. The thing was now approaching him on an almost straight course. Perhaps it had located the natives.

Meanwhile the computer continued its translation, whenever words were uttered. Again, most of it made no sense, and consisted of hushed phrases scattered at random throughout the group.

A truly alarming thing then happened, one that threw Patán into a panic. His inner bank of microphones began transmitting sounds, and these were placed directly in the sand which he'd mounded up to cover the ship. If one of the natives had climbed it and saw his scanner mast, he would be in deep trouble, and that seemed to be what was happening.

Patán listened carefully to the rasping sounds, now heard directly through the hull. Someone was up there digging, but he had no way of knowing who, or where. His IR screen went off target, showed nothing. Whoever was up there was turning his outside scope.

Patán had to do something, but what? He had no weapons aboard, hadn't anticipated the need for any. Yet if he didn't do something quickly, he'd have the whole pack on him instead of just this one. Then his eyes fell on a control used only rarely. It was used to charge the hull when docking with other vessels. Without it it was easy to blow up both ships, or weld them together with discharges of unbalanced electrical potential.

He set it to a level he felt would be less than lethal, yet sufficient to stun. The scratching immediately stopped, and the scope once more responded to interior control. Patán breathed a sigh of relief, then thought again. It wasn't safe to let the being revive. He would only try something else, or one of the others would. He had to be captured. Perhaps without their leader, and that was who he assumed this to be, the others might leave.

He found a heavy tool suitable for use as a club, entered the airlock, and started to open the outer hatch. A cascade of sand entered, along with some of the drying vegetation. Patán could see the native's body stretched out on the ground, slightly larger than he. He poked the being experimentally, detected no reaction, then reached down and dragged him into the airlock. Pausing briefly to clear the hatch's seal of debris, he pulled the covering bush toward it and closed the hatch.

Patán was gratified to discover he had

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gotten one of the dark ones, not too different in color from himself. The native had a cranial wound, but Patán believed it to be superficial, as the being's blood oozed from it rather than flowed. The native was bigger than he was and looked powerful, so Patán got on to the next problem: that of securing his captive.

There was a large roll of tape in the airlock emergency chest. Ordinarily it was used to seal pressure suits if they were punctured or torn, and it therefore had great strength. Patán gave the creature's arms and legs a generous wrapping, then, almost as an afterthought, he covered its eyes.

This done, he left the native in the airlock, closed and sealed the inner hatch, and went back to the control room. Evidently the captured native had bent the sensor masts as he fell. Patán could not focus satisfactorily and couldn't pan with the IR scanner. Nevertheless he did succeed in getting a part of the outside scene on scope.

The big beast darted around through a group of other, smaller images, who scurried back and forth but were gradually herded into a central area. Then the animal broke in two right before Patán's eyes. So: the natives were more primitive then he supposed; they still used animal transport. Some of their broadcast material had shown such creatures, but Patán had assumed their portrayal was intended as fiction. Now he wasn't so sure.

No others approached his concealed ship, though other natives, riding animals, did come. Patán watched closely throughout the night and monitored their conversations. The word "coyote" occurred frequently and Patán was sure it meant something important. But he gained no real insight into the purpose of all this. Finally, just before dawn, the natives left.

As soon as he was certain there were no natives near, Patán went to the lock and dragged the native inside. The native uttered strange words. Patán ignored them, opened the outer hatch, repaired the damage the native had done to his cover, and returned. Later he'd go back out with some tools and straighten the masts, but now he wanted to examine the creature.

Struggling mightily, he raised the creature to its feet and assisted it in hopping toward the control room. Abruptly there was a thud. From the native's garments an object had fallen and clattered to the deck. Patán picked it up and immediately recognized it as a weapon he'd seen portrayed on the broadcasts. Usually, he knew, such things were associated with the animal riders, but they also appeared elsewhere on occasion. And Patán knew these could be dangerous. The natives feared them. He stuck it into his own belt.

Patán guided the native to a bench and plopped him down, not without difficulty. The native's knees bent in the wrong direction and the bench was too low for him. He had trouble maintaining his balance for this reason. Here, in good light, Patán could take his measure, and did. He found few structural differences, and hadn't really expected many. All intelligent life forms followed pretty much the same evolutionary patterns in similar environments, because these were dictated by physical

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and chemical laws that applied the same pressures to each developing creature.

Therefore he set about to explore the minor differences. To do this he had to distinguish garment from native body. The head was capped with an obvious tegument. Patán removed it. Beneath he found hair not unlike his own, though coarser and tightly coiled. He had already been fairly certain that was what it was from viewing the images, but seeing a native in the flesh did prove more enlightening. Picture quality hadn't been all that good.

All in all, when he finished his examination Patán's preconception was confirmed: with a little imagination he could disguise himself to resemble a native very closely. Closely enough, he felt sure, to give him the mobility he needed to repair his ship. And having a captive available to practice on would clinch it. He could become proficient in the language, learn to imitate the mannerisms, and possibly learn to utilize native records to locate the materials he'd need.

Patán switched his computer translater from the exterior mode to interior and placed a microphone near the native. He activated his own. "Coyote," he said, holding the mike closely.

It came out rather loudly and startled the native. He cut the volume and listened in his earphone for translation of the native's reply.

"Food animal," piped the computer. "I shall not answer."

Patán took the native weapon and prodded the creature's neck with it. "Weapon."

"Get your (untranslatable obscenity) piece off my neck, food animal. I know my (untranslatable) rights. I have a right to (call-summon) my (approximation) supporter."

Patán reached up and yanked the tape off the being's eyes. Hair came off with it and the native screamed in pain. He recovered quickly, then looked at Patán and gasped, "What kind of (untranslatable obscenity) (food animal) are you?"

"I am not a (food animal). I am a Fremde. You are aboard my ship, and my prisoner."

"Are you instructing me that I am on a (flying drinking utensil)?" The native's eyes grew large.

"Yes."

"(Approximation) Be instructed, male being. I possess nothing you desire. I merely desire to (untranslatable obscenity) (depart) from your (approximation) (drinking utensil)."

"*You may not depart from my* (drinking utensil) while I have need of you. My (drinking utensil) requires repairs. You will assist."

"You can (approximation) (depart) with your (drinking utensil) (untranslatable)."

"I repeat. My (drinking utensil) cannot depart without repairs."

"Solicit (approximation) -assistance- (approximation) from (untranslatable obscenity) the (food animals)."

"*You* are my prisoner, not the (food animals)."

Silence.

"I shall reward you handsomely if you will assist."

The native looked puzzled. Patan said, "What are your desires?"

"If you cannot repair your (drinking

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utensil) how (untranslatable obscenity) can you fulfill my desires?"

"Name your desires."

The being considered, then said, "Large quantitites of (approximation vegetable composition bearing symbols, used as a native medium of exchange), large numbers of (native females) (native mechanical conveyances, metals and mineral crystals)."

"Easily arranged."

"(Approximate translation: animal waste product)."

"Look around you. Have you ever before seen anything like this?"

"(Approximate translation: animal waste product)."

Patán wasn't sure what to do next, but he noticed a bulge in the native's clothing. He felt the bulge and extracted a sort of pouch through an opening.

"(Approximation) Remove your (manipulating appendages) from my (untranslatable obscenity) pouch."

Patán ignored him and opened it up. Inside he found some of the imprinted vegetable matter the natives had described. Quite crude, he thought. Obviously such things had no intrinsic value.

Leaving the native in the control room, Patán went back to his quarters, which also doubled as his office. The copier he had was a light-duty job; nevertheless it was adequate. He returned a few moments later with fifty duplicates of the native example. The native went pop-eyed at the sight.

"(Animal waste product)," he said, over and over again.

With that demonstration, the native's attitude underwent a remarkable transformation. He became not only less hostile, but he actually seemed conciliatory. If his reaction was typical, this would indeed be the source of Patán's fortune. He contemplated that result with relish.

Conversation got far easier. With the native's active cooperation the computer was able to get closer and closer to the actual meanings of words. Approximations nearly ceased to appear, occurring only rarely. And while the conversation was going on, the computer was not only continuing to monitor current broadcasts, but was culling data from recorded material acquired since planetfall. As a result, the discourse took on the respective idioms of both languages.

"The way I see it, Dude, you and me has got a lot in common: I mean, we both want things we ain't got. On your own turf you're just as bad off as I am. Right?"

"It isn't easy getting to the top, Pussifor. What I have here might look like a lot, but it really isn't. This is not my ship, and almost none of what's in it belongs to me. I work for a company that pays me very little compared to what I produce, and by the standards of my civilization I suppose I could be called poor."

"That's what I mean, Dude. You got to take. They don't give. I been taking all my life. I know how we can take it all if we work together. Now come on, get this stuff off me, will you? I'm all cramped up."

"A tempting idea, I will admit. You do seem to be sincere. However, I am reminded that I am the stranger here; one being, alone on a primitive planet. I am reluctant to trust you that far."

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"I can't do much to help if I'm all tied up, Dude. I got to be able to move."

"Will you accept whatever restraint I impose?"

"Huh?"

"There is a way, but you must understand it does not mean you will then be free."

Pussifor watched the alien leave. Presently he returned with a device: a large, dark-colored ring. "What's that?" Pussifor demanded.

"It's a collar. We use them to control certain beasts which, while normally dangerous, are highly desirable as pets among certain segments of my society." He opened the ring, then snapped it shut again around Pussifor's neck.

"Hey, wait a minute. What does that thing do?"

"Basically, Pussifor, I'm afraid its purpose is to kill you if you attack me. Any change in certain of my body functions will cause the collar to contract and choke you to death. It's programmed to monitor them within a certain distance. Additionally, this one is linked directly into my ship's computer. Beyond a certain distance from the ship the collar will react in the same way it would if you attacked me. Of course, you'll understand that there are certain other things which will set if off that I can't tell you about, but I will assure you that even if your technology possessed the means to cut through it, you'd be dead before that happened."

Pussifor regarded him gravely, and Patán knew the native needed further evidence before he would believe. Carefully he removed the tape that bound the native, taking care to remove as little hair as possible with it.

"Do you feel better now, Pussifor?"

"Yeah, fine, Dude. Like a new man."

"Good. Here's your piece. Feel free to shoot me any time you like." Patán's race didn't smile—physically, that is. Inwardly, he did smile now, because he knew that for the moment that gesture had rendered Pussifor Jones absolutely impotent as an assailant.

Pussifor took the gun, spun its cylinder expertly to check its readiness, and stuck it back in his holster. "OK," he said. "You don't have to worry about me. But what happens if some other dude decides to waste you?"

"What happens to me happens to you. I suggest you make sure nobody tries that. OK, Dude?"

Pussifor proved to be a great help to Patán. Together they could—and did—do a much better job of concealing the alien's ship. Except for the airlock, which was hidden by vegetation transplanted for that purpose, the rest of it was buried under tons of sand. Patán determined that Pussifor could digest Fremde foods, and therefore felt safe in experimenting with human dishes. And, using the computer to augment the process, he learned Pussifor's brand of English to the point where he had no Fremde accent significant enough to attract attention. Pussifor had an opinion about that, too. He said Patán sounded like an Arab.

Further discussion of that remark had resulted in an idea they both liked. Arabs were much in evidence in modern human society. They had wealth and behaved strangely, which, according to Pussifor, took them out of the "nut" category and rendered them merely "eccentric."

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"An eccentric," he told Patán, "was a nut with money." With money you could do pretty much as you liked anywhere on Earth. People favored you, tolerated you, because of the possibility you might be grateful and share some.

"From now on, Patán, you're gonna be an A-rab. You won't look quite so funny in Arabian threads as you would in western clothes. Too bad Arabian women are so sheltered. A veil would be just the thing for hiding your face. We'll have to fix that some other way."

They did. Patán soon sported a heavy artificial beard, which concealed the fact that his own mustache grew from the outer edges of his nostrils instead of from his upper lip. Then it was time to take the show on the road.

"Something wrong, sir?" Bob Upton wasn't used to "hurry up" messages from the Secretary of the Treasury. This one came by phone direct from "His" secretary. "Get over here right away." Klunk—end of message.

"Sit down, please." The secretary was a plump man, inclined to sweat, and he was sweating now, the way politicians did when they had problems.

Upton, solidly professional, in charge of the overall currency printing operation, waited patiently for the secretary to dump the problem, whatever it was, on him.

The man opened an envelope and took out a bill. "Take a look at this," he said.

Upton examined it carefully and felt a little puzzled. He handed it back without comment.

The secretary laid it on the desk, reached in the envelope, and took out another stack of bills. Like the first, they were fives.

Upton examined them also. Then it dawned on him to check the serial numbers. They all had the same one. "Where'd these come from?"

"Off a doper. DEA busted him out in Aurora, Illinois. He had this on him, plus a load of tens and twenties, all just as phony as this stuff. Only he didn't know it was counterfeit."

"I didn't either until I noticed the numbers. It's the best I've ever seen. Absolutely indistinguishable except for that, technically perfect. But why small bills? Why not fifties or hundreds?"

"You tell me. And why would anybody with the kind of talent to do this blow the whole thing by using the same serials?"

"Maybe he never expected anybody'd notice. Singly, they're indetectible. Anybody with the patience to do it could pass them one at a time in perfect safety, and the smaller the bill the easier that'd be. Maybe he just got greedy, or maybe this is a one-shot affair."

"What do you mean?"

"Maybe he printed up a batch and wholesaled it. For something this good he could get maybe two bits on the dollar. And there may be millions floating around. We may never find it all if it's scattered, and it might not be worth it to try."

"We've got to try."

"Spend thousands of manhours matching numbers on fives and tens? Won't work anyway. Besides, there's another, easier way. Only another government could duplicate our currency this closely, and then only with inside

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help from one of our own people. That's where we have to look for the answer."

"Then get on it, Upton. Find these people. Stop them. And whatever else you do, for God's sake, keep this between us. Understand?"

Upton did understand. He left the secretary's office knowing he couldn't comply with that last order. Workmanship might be duplicated by foreign craftsmen, but not the paper. He suspected—no, he *knew* it would be genuine, and that implied far more than he'd been willing to tell the secretary. If what he suspected was true, it could bring down the government, destroy the nation's faith in its currency. There was only one answer to that. When his investigation was finished he'd have to talk to the president.

Noah Utter was still studying the card when his secretary ushered its owner into his office. He hadn't suspected P.F. Jones would be black. However, there really wasn't anything unusual about that anymore. He pointed to a chair and looked the man over. There was something odd about him. He seemed to have the wrong proportions from the shoulders up, especially an oddly thick neck. The man sat down.

"What can I do for you, Mr. Jones?"

"For me, nothing. For Sheik Patáni you can supply peace of mind."

"I don't understand."

"The sheik is a wealthy man, Mr. Utter, but at the present time he is far too liquid. His wealth is all invested in transitory things. He wishes to make a more permanent investment. One that is safer. He wishes to purchase land."

"Well, that's my business, Mr. Jones. Just exactly what kind of land does he want?"

"He had a specific property in mind: the Agua Dulce Ranch."

"Why? It's hardly a ranch anymore. So rundown, even old. Juan Guerra himself don't call it a ranch nowadays. I hadn't heard it was for sale. In fact, even if it is, your boss'd be a fool to buy. All Juan's got is a life estate. The remaindermen sold their interest to the government years ago. Soon as Juan dies the Park will take it over."

"Nevertheless, that is Sheik Patáni's desire. Perhaps he wants the water rights. Of course, if you feel the assignment is beyond your capabilities we will try elsewhere."

"No, no. I didn't say that at all. What was he thinking of offering for the place?"

"Whatever it takes, Mr. Utter."

Utter licked his lips and thought about the commission this could bring. Water was precious in these parts, and maybe what the Arab was planning did make sense. Utter didn't personally know of any other deals, but perhaps the man was buying other parcels on the Q.T. If so, there might be other deals and other commissions in it for him. "I'll go see Juan. Where can I reach you?"

"Nowhere. I'll check back with you at the end of the week."

He got up from the chair and walked out of Utter's office. Utter sat there for long moments, dumfounded. Eccentrics he could take; insolent nuts he'd never get used to.

Regional Supervisor Cecilio Ruiz had reason to smile. A few years back it had looked as if his career was finished.

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Now things were looking up. What he'd once considered his place of exile was now pretty much his private domain, and he felt a vast satisfaction in that.

The party over at Agua Dulce had been great. Sheik Patáni really knew how to throw one. Cecilio had never seen so much food or so many beautiful girls, nor had so many beautiful girls ever been quite so nice to him all at once. He found himself envying the sheik, who presumably could have that any time he wanted. Cecilio earnestly hoped he would be invited back for the next party, and he thought that possibility was a good one.

Where else could a guy like him hobnob with so many important people, people like Deputy Secretary Howard Schmutzig of the Interior Department or Congressman O'Neal? Cecilio believed his fortunes had changed, and he felt, if he played his hand right, he might become the big enchilada he'd always wanted to be.

P.F. Jones was the key to that. What an organizer he was. Ruiz was mystified by his energy, his eloquence, the way he could manage other people. Cecilio himself wasn't fooled, of course. He knew he was far too astute to be deceived. Jones treated him as an equal, was genuinely friendly.

"We have some big things planned for this area, Cecilio: cattle, mining, maybe even some resort properties pretty soon. You don't need to worry about Agua Dulce land. We'll see that nothing gets through here. You can put your people elsewhere. Incidently, we've got a few exploration crews out there now, seismographic teams and such. You've probably heard about our flying crane, if you haven't seen it."

Indeed he had. You could hear the thing for thirty miles. It was the biggest aircraft Cecilio had ever laid eyes on. "As long as I don't see it carrying wetbacks," he said, laughing.

"How much, Mr. Upton?"

"I wish I could be exact, Mr. President, but the fact is, we don't really know. Our best guess is between eighty and two hundred million dollars. That's in this country. But we know the same thing's happened to the peso and the Canadian dollar: maybe other countries' currency, too."

"My God! And you don't have any idea who's behind it?"

"None. The stuff we've identified seems to be concentrated in the big cities, generally the poorer areas. We've busted thousands of minor gamblers, drug pushers, suspicious businesses, and the like. Nobody knows who Mr. Big is; most of them don't even realize the stuff's queer. And once it gets into ordinary commerce, forget it; it's just like any other bill."

"How about the Mob?"

"No. They're not involved. They're just as upset as we are. And they've got another problem: anything that upsets the currency to the extent this has could provoke some kind of fundamental change. They don't want that. It'd leave them with too much explaining to do, if we suddenly started printing blue money instead of green. They've got too much undocumented cash on hand."

"Maybe we ought to consider that."

"We have. We decided it wouldn't work. The counterfeiters would just

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change colors too, the way they changed the numbers after we caught on to the first batch. We think they do that routinely now, after every run."

The president stood. He was a big man: a Westerner with a slight twang in his voice. "You're sure this isn't some Russian operation?"

"We are. Even they don't have the technical capability to do this. And if I didn't know it was impossible, I'd say it had to be done by my own office, in our plant, by our own people, but I know it isn't. I'm convinced it's not simply being printed, either. Everything is too perfect for that. I think it's being duplicated, some way, somehow, molecule by molecule, paper ink and all."

"Then paper money's out altogether. That's what you're saying?"

"Basically, yes. Paper money can't hold any value under these circumstances. We have two choices: back to something with intrinsic value or to a cashless society. Nothing else is going to work."

"I'm not sure Congress would go along with either one, Mr. Upton. Worse yet, Congress is full of blabbermouths. How do we keep a thing like this quiet?"

"We bring them in, en masse, and show them the evidence, Mr. President. Chances are most of them'll have some of the phony stuff on them. We have the authority to confiscate what there is, right on the spot."

"Now what, Patán? What do we do for money? How do you keep this operation going without cash?"

"Pussifor. Do not worry. There are other ways."

"I'd be interested in hearing about them. I wanted to get out of cash a long time ago. You said no, too risky. You didn't want records. Well, now all there is is records and you haven't got two credits to rub together. How are we going to pay the people who work for us? Tell me that. What happens when they all walk out? How do you pay off a cop when you've got to punch your numbers into the machine and everybody can see where it came from?"

"How are the rest of the criminals in this society handling it?"

"I don't know, but I'll bet they all got burned as bad as we did."

"Then I suggest you find out. You can do that, can't you?"

"You know I can, Patán. That's not the point. The point is, when I first joined up with you, you said we were going to get rich. We're not rich yet. All we got is problems, not the least of which is you're too dumb to fix your own ship."

"It takes time, Pussifor. I'm a trader, not an engineer. It's damaged worse than I realized, but now that we have it here it's only a question of time."

"Well, I'm beginning to wonder if I played this thing right from the start. Maybe I should have gone to the cops with it then."

"Pussifor, feel your neck. See if your collar is still there."

Pussifor's face became sober at once. Patán hadn't mentioned the collar since those first days. The rest of the time they'd treated each other as equals, if not friends. It looked like that sort of thing was over.

"I'll start checking," he said to Patán.

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* * *

"Gold?"

"That's right, chief. Gold. That's the new money. Those turkeys we busted had forty pounds of it. Troy pounds, that is. We also got two dead dopers and three keys of Mexican mud, twenty-two percent pure. So much for the cashless society."

President Moore was now deeply troubled, and now very much uncertain about his chances for re-election. Six months ago he and Congress had very slyly sold the public a bill of goods. That's what it had amounted to. Except for certain key and very influential people, the public thought the cashless society was designed to wipe out crime.

Informed people, of course, knew better. They knew it was the wrong answer. Just as horse thieves were eliminated from society by the elimination of horses, so were most bank robbers. And where horse thieves turned to stealing automobiles, bank robbers turned to jewelry stores, art galleries, industrial metals dealers, and the like. Muggers took watches or gold teeth. People went on stealing cars, bicycles, or whatever else was handy. And an underworld economy of small, valuable, and easily portable tangibles grew up, dope included.

Honest people continued to abide by the law and pay taxes as they always had. Criminals continued not to do these things as they always had.

"Bob, I put you in the cabinet for two reasons; first, I thought you'd make a good Attorney General, and second, I wanted to reward you for the job you did at the Treasury. But it seems to me you're telling me we're back to square one."

"I am. You know I never really liked this cashless thing in the first place. I went along with the crowd because that's what you wanted. But I say now just what I said then: we should go back to gold."

"How's that going to help? Wouldn't we be better off outlawing it?"

"No. That won't work. People won't understand why you're doing it, as they did back in Roosevelt's day. Then there was a reason. Now there isn't. And you can't even offer them a substitute, as he did, and you can't tell them why you can't."

"It'll wreck the economy. Think of it: all that gold pouring out of the country into the Middle East, into Western Europe and Japan. How long will it be before the country is broke? What do we do when the big gold producers start dictating our foreign policy?"

"It won't happen, Mr. President. I know what you're thinking, and I know all the arguments against the gold standard. I've heard them over and over.

"I tell you gold will work. It's working now, and the reason it works is that gold alone isn't the real medium of exchange. It's a symbol, just like paper money, but the real backing for a national currency is its industrial production, its produce, its ores, or whatever else it is that the world needs. And it so happens that the United States has more of what the world needs than anybody else on the planet.

"Think about that a minute: did anybody outside the eastern bloc ever take rubles in exchange for goods? Of course not. Russian money's just paper. When

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we trade with them, they pay in dollars, and they buy the dollars with gold. So as far as they're concerned, even though they're the number two gold producer, nothing changes. South Africa's economy works the same way, except they never have been off the gold standard. The Rand may not be officially convertible, but that's the practical effect.

"There's one other advantage to gold, Mr. President. It's almightly hard to counterfeit. Sure, you can debase it, but what do you want to bet that the day we make it legal tender, if we do, somebody'll start marketing a pocket-sized detector."

"What happens if we don't convert? I want your honest opinion."

"We'll have economic chaos until the next congressional election. Then the party that advocates the gold standard will take power, or retain it, as the case may be."

"Gold. How fortunate," said Patán, sounding very pleased. "You were entirely correct to accumulate it, Pussifor."

"It's easy, Patán. Even easier than making queer money. I wish we'd thought of this in the first place. All we have to do is find a stash and suck it out. People believe anything they see printed on paper. Why, I got people in banks all over the country. I got them in the big brokerage offices in New York. And all of them trading paper for gold, taking a little piece of the action and giving the rest to me—uh, us. When I think how I used to bust my buns on penny-ante stuff, it makes me sick."

"It was indeed fortunate that we met, Pussifor, but I assure you, when contact is re-established with my people it will be even better."

"How will it be better, Patán? What can we have then that we haven't got now?"

"You would not believe me if I told you, Pussifor. This 'place' we live in, for instance, it's primitive."

"It looks OK to me." Pussifor replied. He enjoyed opulence, and in his estimation, this was it. He thought about the huge house with its carpet, pile an inch deep, and half its thirty-five rooms crammed with expensive furniture, art objects, and other fine things. He thought about the "guests" he had: women collected from everywhere who, try as they might, couldn't be nice enough to him. Out in the garage were a dozen or more luxury cars. On the private airstrip sat a sleek jet. He had only to press a button and servants appeared to do his bidding. What could beat this?

Then he remembered the collar he wore.

"How are the repairs coming, Patán?"

"Very slowly. But I am making progress."

"Look, Patán, maybe it's time for you to give up on this; get some help, instead of trying to do it all yourself."

"No. That I will not do. It's too dangerous. I've come too far to risk discovery. Besides, your science isn't up to it. The problem I'm having is locating suitable materials. Your people just don't have them, so I end up using substitutes. That, in itself, might get me killed, but at least I know how the ship is supposed to work. If I let a bunch of natives play with it anything could happen."

It seemed to Pussifor that Patán had

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used the word "native" demeaningly, but he let it pass. "I think you're missing a bet, Patán. I learned a long time ago that ignorance doesn't mean the same thing as stupidity. I was once ignorant myself, but you'll have to agree none of this would be here without my help."

"That's different, Pussifor. You're in your own element and all you had to do was follow your natural proclivities on a larger scale. I'm dealing with scientific principles your people don't understand and technical processes even I don't understand. It's one thing to know something is possible and quite another to translate that into hardware. Even knowing how something works is not enough to repair it when it breaks down. Not if you don't have the technology to produce spare parts."

"Money can buy anything, Patán. We've got money. We can buy the brains to fix your ship. We can buy the technology you need right off somebody else's shelf."

"No, Pussifor. You'll buy trouble, that's what you'll buy. I can't risk it. Do you suppose for one moment your government couldn't outbid us if they had any inkling I existed? How do you stop people from telling others what they see?"

"You give them a share, Patán, just like you gave me a share. Have I ever failed you?"

"No. But then, you have an even greater incentive not to. You can't betray me, Pussifor."

"Neither could anyone else, if you had collars for them."

"You know there's only one. You're wearing it."

"Make more. You could, couldn't you?"

"Yes, it is possible, I suppose. Certainly no more difficult than some of the things I'm already doing to repair the ship."

"Then what's your problem? You supply the control; I'll find the talent."

"You know what you're asking is illegal, Mr. Bedford. The statute specifically forbids the CIA from conducting domestic operations, even when there's a national security reason, unless Congress had made a declaration of war. Even the president can't authorize it."

"I'm not asking for anything like that, Mr. Upton. All I want is what information you have on file regarding these disappearances."

"You can't circumvent it that way, either. Making me the cat's paw still violates the law. Besides, I don't see the connection to national security."

"You don't! Man, what else can it be when people like Darwin Gunderson start dropping out of sight? And he's only one of them. Fifteen of the country's top scientists just fade out, and you say there's no funny business going on?"

"They're private citizens, Mr. Bedford. They have constitutional rights just like everybody else, which means we can't tell them what to do. Besides, they didn't just drop out of sight. We know where every one of them is. It's our job to know, remember?"

"Then what's the big deal. Tell us. What harm can it do?"

"The harm, Mr. Bedford, is that I'll have violated my oath of office, broken the law, and helped your people inter-

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fere with the civil rights of these citizens. Now, you show me how that sort of thing can be justified and maybe I'll reconsider."

Bedford rose, face flushed, straining to find words, but succeeding only in sputtering. He knew if he found the words he wanted there'd be a scene, and if he didn't, he'd choke. So he quickly walked out of the room, exploding only when he was safely in the elevator. Fortunately he was its only passenger.

Upton opened the top right-hand drawer of his desk, took out a green phone with no dial, and lifted the receiver to his ear. In a moment there was a click, and a man's voice spoke.

"Mr. President—Bedford just left my office. He's asking questions."

"What did you tell him?"

"Basically, nothing. But he won't stop there. He's not the kind who believes in the sanctity of the law. He'll do it on his own if we don't stop him."

"I'm sorry to hear that, but I am inclined to agree with you. The question is, how do we stop him?"

"Let him in on it."

"Too many people know already. The more who know the greater the risk of leaks. If we do let him in, can we count on his ability to control his people?"

"My personal opinion would be that we could. He's not liked all that well, but he is respected in his own organization. If I had my druthers I'd prefer to rely on that kind of a man than a good-time Charley. Loyalties run deeper."

"Then go ahead, Bob: set him up."

"Can't, boss. He wouldn't buy it from me. This is one you're going to have to handle yourself."

"Splendid!" Patán raised the hood and ducked his head out from under the analyzer. "Structurally and chemically identical to the original part. I won't have to worry about this failing."

"See, I told you we weren't stupid, just a little backward. If you give us a chance to learn we learn quick. You couldn't have done this by yourself in a million years, could you?"

Patán removed the helmet and looked at the analyzer. "No, I have to admit that once again results have proven you correct, Pussifor." Actually, in his view, the analyzer was crude. All his new equipment was, by Fremde standards. He'd purposely kept as much from the natives as he dared, and while the ship's data banks had supplied much of the information needed to construct it, that too had been general information. In truth, the natives were every bit as bright as Pussifor claimed. They'd figured out the details and puzzled out the engineering problems virtually unaided.

He handed the part to Dr. Gunderson. Gunderson, bespectacled, portly, and dressed in coveralls, didn't really belong to this part of it. He was a theorist. But he seemed to be interested in everything. Patán didn't care, as long as Gunderson produced results and wore the collar. All of the native workers now did, of course.

Patán found that state of affairs highly amusing. Again he congratulated himself in his luck. Of all the natives, there was none to compare with the jewel he'd found in Pussifor Jones. Pussifor appeared to be unique.

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Not only was he knowledgeable, he was also greedy, ambitious, and most of all, an accomplished confidence man. Patán found himself admiring the native more and more, and almost liking him. But he knew that when the time came, as it inevitably must, Pussifor's collar would contract and choke the life from him.

He hoped that would not happen soon. There was much more to be done and Pussifor still had many uses. His organizational skills were still needed.

It was Pussifor who had slowly and inexorably corrupted one governmental official after another. It was Pussifor who'd gotten control of that government, the most powerful on the planet. He was the reason the President of the United States now wore Patán's collar. It was Pussifor who'd first invented, then convincingly told, the stupendous lie.

Patan's amusement over that still bubbled up whenever he thought of it. His meeting with the president had been brief, and Pussifor had done the talking, right here in the hangar, one foot propped on the Fremde ship.

Asylum. That's what they thought he wanted. Protection from enemies. And his enemies were now Earth's enemies. Earth had to get ready to fight a modern war in space. Patán was a patriot among his own people; imagine that. His people could use all the allies they could get, but must insist they be truly allies. Repair this ship; learn all you can while you do it; but while you do it you are hostage to me and you wear the collar. Refuse and I destroy the ship, leaving you to the mercy of our ancient enemy.

"It's a good thing they don't know you like I do," Pussifor had told him afterward. "You're just not a good enough con man to do it with a straight face. That's the hard part. Of course, they didn't notice."

No, thought Patán, in all the universe he'd probably never again encounter the likes of Pussifor Jones.

Cecilio Ruiz lay on a ridge overlooking the little valley below him. The land was strewn with broken marl, pieces of which had worked loose and prodded his ribs with their points. Through the glasses he could see the lowboy inching its way across the valley floor. Behind it the massive crane followed. Bringing up the rear was a tank-truck oddly small and squat, behind that a jeep and a covered stake truck.

Presently the lowboy stopped. Slings were thrown around its burden, which was lifted, still covered by tarpaulins, to the ground. It stood there on spindly legs, its puffy little tires straining under its weight, while men poured from a spouted can into a hole in its side.

Then they retreated, except for two of them, who disappeared under the tarpaulins, to be seen no more. Presently a great cloud arose, accompanied by a shrill sound that hurt Cecilio's ears. Seconds later it ceased, and for long moments dust drifted away from his position. At the time he did not realize how fortunate that was.

"Excellent, Pussifor. Not a rumble or a ripple. It's as good as new. I'm satisfied we don't need any more tests. Get the tanker back here and fill it up. I want to get going."

"OK, but first I have something I've

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been saving for you: sort of a going-away present."

"I'm touched, Pussifor. I'm sure I shall cherish it, whatever it is."

Pussifor took out a flat box covered with purple velvet. "I had it made especially for you. Here, turn around. I want it to be a surprise."

Almost as soon as he did it, Patán realized he'd made a mistake. The object Pussifor had clamped around his neck was tight. It was a very close fit, and it clicked ominously as it closed.

"How do you like it?"

Patán turned. Pussifor held a mirror in which the object now appeared. But why was he still standing? The collar should have contracted and choked him. He should have been down on the deck writhing in agony. And he wasn't. He was standing there, perfectly calm, grinning from ear to ear, well within range of the monitors—yet they had failed to act, despite Patán's excited state.

"Great craftsmanship, huh? Gold-plated. And those jewels are all real. But I like the inscription best."

Patán, frightened, bewildered and very anxious to depart, had little patience with this. "It's backward to me. What does it say?"

"It says *Property of the United States of America.*"

Patán turned, grasped the panel until his fingers found the console. He desperately stabbed out a numerical sequence he'd never counted on using. Nothing happened. Pussifor retained his grin.

"Would you like to take a poke at me? Come on, go ahead. See what happens." Then the grin faded. Pussifor took a small transmitter out of his pocket and extended the antenna. "Come and get him, Cecilio."

"Who's that?"

"Border Patrol. You're an illegal alien, you know."

Perhaps it was the long association with human beings. Perhaps it was because he was speaking a human language. Patán didn't know. He found himself sputtering: "How, Pussifor? And why?"

"How? Easy. I told you: human beings aren't stupid, just a little backward compared to you. We may stay that way for a while yet, but we'll catch up. You'll see. And when we do, we'll see who exploits who.

"As for why? That's the easy part. All my life I've had to put up with some turkey's foot on my neck, somebody standing between me and something I wanted. And why was he there instead of me? Because I was ignorant, Dude; ignorant, not stupid.

"Then you came along, and you say out there's a place where they got all kinds of stuff you're gonna want; stuff I did want. And what's the first thing you do? You put your foot on old Pussifor's neck and you stand there and tell me I can't have it 'cause I'm too ignorant.

"Well, now you see, Dude; I done something about that. I found out what you wanted, and you had to show me what you knew so I could get it for you. And you know what? You was right about one thing: the government did outbid you. You probably weren't even thinking about the same thing I was when you said it. No, I guess you wouldn't. You didn't grow up in the

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street like I did so you wouldn't know about rule one.

"Price, Dude. Everything has a price. Everything and everybody: you, me, everybody. You're foolin' with a black man, Dude, and we know that better'n anybody. We been slaves. We like it better with the chains off.

"You know where you screwed up, Dude? It was that collar you put on me. It don't work like that. If you'd have left me alone, trusted me, I would have helped you anyway. You would have been just another crook, like me, that's all. But you had to make me a slave."

Cecilio Ruiz crawled under the tarp and stuck his head into the control room. Pussifor halted him, raising his hand.

"There's one more thing I got to say to you, Dude: that's this. No lock, no chain made can hold a human being for any longer than it takes him to figure out how to break it. I started on mine the second I felt it snap shut around my neck, and broke it long ago. I could have killed you any time in the last two years. Any of the rest of them could, too. Your locks worked fine, only by then we also had the keys. That part was easy. Every one of those collars is a dud, except yours.

"But you still had something I wanted; you were still between me and the door, Dude. You still knew something we didn't. Not any more. Ignorance is temporary. Stupidity's permanent, and I'm afraid you're never going to get any smarter than you are right now. Meanwhile, now that the door's open, and we know what's out there, we're going out and take it. You can have him now, Cecilio."

Cecilio gave Patán a prod. He gave Pussifor a knowing wink. He'd listened carefully, and he agreed with every word. Always, the smart ones found their way out of the barrio. ■

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the reference library

By Spider Robinson

Friday, Robert A. Heinlein, Holt, Rinehart and Winston, $14.95, 384 pp.
High Tension, Dean Ing, Ace, $2.50, 256 pp.

About that new Heinlein novel . . .

No, wait, first I should throw in a:

PREFACE

No. You are mistaken. I am *not*, repeat NOT, back.

I know, I know, it looks like I'm back, but I'm not. Really. I have no intention of resuming regular or irregular reviewing duties for this magazine (or any other) at any time in the forseeable future. For one thing, it would not be fair to Tom Easton, who accepted the entire sack with every right to expect that he'd get to keep it, and for another it would cut into my sleeping time. No sir, I'm out of the book review business, that's flat.

But there's a few books that have come my way that I've just got to tell you about. That new Heinlein, for example . . .

But first:

FOREWORD

I should have known better.

When I left six riddles unsolved in "Pyotr's Story," (*Analog*, Oct. 12, 1981) and published my address at the end of the story, offering a chit good for a free drink at Callahan's Bar to any reader who correctly deduced the answers and the category—well, let's face it, I did anticipate that I might notice a slight bulge in my mail for while. I mean, I *was* asking for it.

But Lord, did I get it!

I projected perhaps a hundred responses, tops. I used to publish my address in *Galaxy* magazine all the time, and each appearance was good for from five to twenty letters a week. From what

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Ben and Stan have told me about sluggish response to the AnLab poll, I figured that *Analog* readers were less likely to respond than *Galaxy* readers, and adjusted my expectations accordingly.

I have not kept an accurate accounting, but I would estimate that as of today, 9 February 1982, I have received somewhere between 800 and 1,000 pieces of mail as a result of that fool contest. There must be something about puzzles that gets to you people. . . .

As soon as the first sack arrived (that's not hyperbole: I mean a full sack of mail, the first of several), I took in the situation, grasped the true extent of my folly (in public, mind you) and, with the cool aplomb which has made my name a sellword on Wall Street, instantly formed a plan: I kicked the sack into a corner and fled the country. My wife Jeanne had received a providential invitation to perform with Beverly Brown Dansensemble: Theatre for Bodies and Voices, at the Riverside Dance Festival in what David Letterman refers to as "one of the more interesting cities in the tri-state area," New York—I packed my suitcase, my child, and my pipe and went with her. And sacks of mail grew in her dance studio behind us in Halifax (for it was that address I put in *Analog*, in a feeble attempt to forestall letter bombs and indefatigable process servers).

And then some helpful soul forwarded all those sacks to us in NYC.

Now: since I expected to answer these letters from Canada, I carefully requested that respondents enclose an International Reply Coupon (supposed by law to be obtainable at any post office in the U.S., Canada, and the world at large), since U.S. stamps are useless in Canada. A good (bad) 25% of respondents failed, enclosed U.S. stamps or nothing at all, but forget that a moment: here I am on Manhattan Island in August with about 400-500 IRCs in my hands, and I wait in line for an hour and a quarter in the post office, and when I get to the window a surly homunculus with a genuinely incredible goiter informs me, with immense satisfaction, that regulations forbid him to accept more than 10 IRCs at one time.

So I burned petrol to haul those sacks back home to Halifax. Where I united them with their less-traveled cousins, and settled down to answering the goddamned things.

Tabulations:

Oddly, the ratio of right to wrong answers remained rock-constant: every time I stopped and ran subtotals (six times) it ran almost precisely two right answers for every wrong. Call it a 67% success rate for the *Analog* audience as a group. (Some of the *wrong* answers were absolutely brilliant!) The only correlation of any significance that I noted was that responses which came on university departmental letterhead were usually wrong—and several of the exceptions turned out to be grad students or TAs using their professor's stationery. In other words, holders of tenure at institutes of higher education averaged much dumber than the general populace or any other group in the sample.

Speaking of dumb, though, another thing I found instructive about all this was the performance of *Analog* readers in following the simplest of explicit written instructions. I asked that each respondent enclose an SAE (self-addressed envelope) along with the abovementioned IRC. Now, some few respondents claimed ignorance of IRCs, or said that their local postmaster claimed ignorance, and the expedients they tried were many and various. Three or four sent *cash*, and only one of those was

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bright enough to send *Canadian* cash. But at least 20% of the responses I received had *no* postage (and the rate-to-States *doubled* the month I got home to Halifax). Postageless letters that were not particularly amusing or endearing were used to insulate the attic. And 25% of respondents enclosed no return address envelope: same doctrine applied.

But don't, I pray you, feel sorry for me. Even when you figure in the cost of Xeroxing form-letters (one for right answers, one for wrong) and the postage and envelopes I got burned for, and the hours of work-time lost, and the wear and tear on my tongue (did you ever lick a thousand envelopes and a couple of hundred stamps?), I still made out just fine. For one thing, it shouldn't be a total loss, I took the opportunity to make up a *third* form letter—a press release listing all the books I have in print and where to get them and such—and fold one into every envelope. For another, I was able to insulate my entire attic and start on the root cellar.

For another, the vast majority of your letters was just delightful!

Some were hilarious. Some were heart-warming. Some were ingenious. Some were touching. Some were enlightening. Remarkably few managed to "fade into the woodwork," to become just one-more-god-damned-letter-to-be-processed—'most all of you came across as people, and I find that as a group I *like* you. I am encouraged by you. I am cheered by you.

And to those of you who sent riddles of your own, by way of riposte, I can only say: "For*get* it!" At last count there were roughly 5,000 of these on hand, and I refuse to even think about it, I'm sorry.

And no, I'm not going to print the answers here. Or my address.

One more digression, before I leave the subject of mail: a little booby-trap I left in my last appearance in these pages. In reviewing Charlie Saunders's new novel *Imaro* in my farewell (hah!) column, I spoke of a perceived paucity of black characters in science fiction. I named a bare handful of such characters, and asked if readers could name any more. Readers damned well could! About a dozen I knew about and had omitted as bait, and a dozen and a half I didn't know. But the interesting thing, to me—in light of the fact that a thousand of you responded to a riddle contest—is the number of readers who wrote to tell me about those thirty black characters in well-known recent SF.

Six, as of even date.

THE MEAT

Okay, enough stalling.

You have been very patient; it's time now to get to the real reason I'm back here violating the conditions of my parole: the new Heinlein novel from Holt, Rinehart and Winston. I have dawdled this long in part because I can't quite figure out how to begin telling you about it. I'll just take a running start:

Friday is probably the best novel Robert Heinlein has published in the last ten years, and Friday, its protagonist and narrator, is one of his most unique and lovable characters. It is a grand and sprawling and scary book, a travelogue of a decaying Earth through the eyes of a very privileged observer—and a moving memoir of that most unprecedented of observers. I think that those few readers (and my mail indicates that they are very few) who were confused or disappointed by the last few admittedly idiosyncratic Heinleins will fall upon this one with cries of delight—it is

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closer in tone, structure and scope to Good Ol' Golden Age Heinlein The Way He Useta, in contrast to the last two or three breathtaking (and successful) experiments. Which is not to say that I think *Friday* is less subtle or ambitious than those books—but I think it is easier to read on a purely surface level, as an intriguing and exciting adventure story, if that is what you want to do with it. There's less talk and more action, this time around. (Friday herself, for example, has killed a man and been both gang-raped and tortured before fifteen pages have elapsed—and before long she is having *serious* problems as well.) The issues Heinlein grappled with in his last three novels were, in order, the nature of identity, the nature of wisdom, and the nature of reality. Here his concern is only the end of the world.

Heinlein has been creating truly original characters, unprecedented in literature, for over forty years now—but with Friday he has perhaps outdone himself. SF has had many characters who thought they were human and turned out to be wrong. With the exception of a Martian named Smith, I can think of no other character who believes herself to be *non*-human—and is just as wrong. She is one better than what John Campbell asked for: she is someone who thinks as well as a human, but not *like* a human—who nonetheless is at least as human as thee and me.

Friday is, and was raised as, an Artificial Person. In the idiom of her time, "her mother was a test-tube; her father was a knife." She grew up in a public creche, aware that she was property. Legally speaking, such genetically modified beings are considered Living Artifacts; socially they rank somewhere between, say, a talking dog and a true human moron, tolerated but despised. When we meet her, Friday is, and has been for many years, Passing as human—but the only one she has failed to convince is herself. Although she is *much* smarter, faster, stronger, and deadlier than a true human, and quite beautiful besides, she has a massive (fairly well compensated) inferiority complex, and a desperate poignant yearning for a *family*, for a sense of *belonging*.

Which is difficult, considering the ficton she has grown up in. North America has become Balkanized: the United States are no more, and it can take more than just a passport and a bribe to travel safely between, say, the California Confederacy and the Chicago Imperium. Governmental entities of any kind, however, are much less powerful than corporate entities—and much harder to fight. (As a character in *Friday* says, "*Where is* IBM?") At least eight extrasolar colonies have been established—but it is difficult to tell *from Earth* which of these might be a nice place to which to emigrate, as all the PR is written by people who want you to emigrate.

Through this chaotic ficton, little Friday makes her way with relative confidence. She is a courier, perhaps the best in human space—what she carries gets through. She works for an organization whose name she does not know, whose nature and purpose she does not know, and her personal loyalty is to its apparent head, whose name she does not know. She calls him Boss. Long-time

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Heinlein readers know him by another name, but I'll get to that later. At Boss's request, Friday carries packages—whose nature she does not know—to *anywhere,* and God help the ordinary human who gets in her way. She is married when we meet her (yes, she *does* have a navel—a much better one than yours, in fact, no matter what shape your stomach's in), to six adults and assorted babies and cats in Christchurch, New Zealand, which Heinlein convincingly portrays as the single most beautiful place on Earth. But almost at once her life, indeed her planet, begins falling apart.

For Friday's saga takes place at a grim point in Future History—the last days of Terran civilization, an age so demented and out of control that only a very few of the very brightest can even identify the forces which are dooming it. Tragedy on an epic scale, in which millions die without ever knowing why. But Boss, an ancient and ornery man with one eye and two canes, is striving to avert another Dark Age, and Friday is one of his most important tools. The story of their relationship, as twisted and beautiful as a bonsai, makes for some startling and moving reading.

One unusual aspect of Friday I would like to note here. Sometime in the last ten years I formed the whimsical habit of keeping a pad handy while reading a new Heinlein. All sorts of notes get jotted down. With the last two or three books I found myself keeping running lists of all the various subgroups of humanity that his characters poked fun at or heaped scorn upon—with the vague idea that if the old man were ever successfully assassinated, at least I would have a preliminary catalog of suspects. You know: teachers of creative writing, pacifists, critics, Californians, contemporary architects, lawyers, assorted classes of people for whom Heinlein has hinted that his respect is less than total or automatic. Oddly, I found *fewer* such demolitionary asides in *Friday* than in any of the last four Heinlein novels—to the contrary, this time he seems to have gone out of his way to point out things that he *admires* about our race and our planet. He says many very good things, and one very bad thing, about Christchurch, New Zealand, and the people who live there. He speaks with admiration and approval of British Canada and British Canadians—quite correctly. He has (forgive me; even I make this error once in a while—what I mean is, "His *characters* have") nice things to say about mercenaries, rapists, assassins, and (most astonishing to me) even *lawyers.* After a couple of hundred pages during which Friday has, at various points on the globe, consumed some of the finest and most mouth-wateringly depicted cuisine ever offered to mortal person, she reaches the California Confederacy, where Heinlein causes her to eat, voluntarily and with pleasure, "California's contribution to haute cuisine," A Burger King Whopper.

At the very moment that Terran society is being torn apart by the inexorable forces of history, we are given a tour of some its most agreeable aspects by a very experienced and tasteful world traveler. Friday, I mean.

Having said all this, I must speak of my one problem with *Friday* so far.

I have long since reached the point

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where, if there is something I don't quite understand about a Heinlein novel, I assume I must have read it clumsily, and wait to grok in fullness. Certain aspects of the ending of "*The Number of the Beast*—" confused me—until Heinlein explained the anagrammatic nature of The Beast, and it all fell into place. So perhaps I'm missing something here— but I *think* that Robert Heinlein has invented a *new error*.

The nature of science fiction fosters the "in-joke," the insider's reference that will only be understood by those in the know. Example: in the story "Melancholy Elephants," published in this magazine in June 1982, I made a passing reference to a computer-reconstructed hologram of "the immortal Shara Drummond"—a throwaway remark which will mean nothing to any reader who missed my and Jeanne's *Stardance* in all of its previous incarnations. I've always enjoyed such things—an in-joke can be a piquant little spice to a story. Like nutmeg. Try baking a cake of nutmeg sometime. What I mean by that is, the classic way to *misuse* an in-joke is to make the story depend on it, so that those who miss the in-joke reference will fail to comprehend the story. Only once has Heinlein come close to that: parts of the ending of "*The Number of the Beast*—" will be relatively meaningless for any reader who has not already been a faithful Heinlein reader for many years. On the other hand, at the time that Heinlein made that artistic decision, reliable evidence indicated that the "insider" group thus defined includes over two million people—and sales seem to have borne this out, so perhaps it cannot be argued that he was limiting his audience much. Besides, after forty-plus years of service, surely a man is entitled to address *one* book to just his close friends.

But here I think he has done a complete one-eighty: thrown in an in-joke that will confuse and trouble *only those readers who get the reference*.

I DO NOT want to give away any surprises. Suffice it to say that (as I've already hinted) Boss turns out to be a character from another Heinlein story, one of his most memorable and controversial. As I understand the rules of the Interuniversal Society for Eschatological Pantheistic Multiple-Ego Solipsism, that inexorably links the ficton of the earlier story with this one—and if so, the plot of *Friday* suddenly springs a couple of sharp and serious leaks. Putting this as carefully as possible so as not to spoil the book for anyone who doesn't get the reference, *if* Boss is in fact who the earlier story says he is, then he displays astonishing incompetence and stupidity in this book—and I cannot for the *life* of me understand why he fails to teach Friday the language he taught to two of her ancestors. By the end of the book, she is a "marteau sans maître," a perfect tool being employed at PTA meetings—and she has not even managed to have her sterility reversed: her priceless genetic heritage is lost.

Now, of course, even if you do get the in-joke reference, and become just as puzzled and troubled as I am by the above—it may well be that what we have just done is develop an appetite for the *sequel* to *Friday* (*Saturday*?) (*Satyrday*?) in which all those questions are addressed. I've given up putting anything past Robert Heinlein—and it might

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just suit his twisted sense of humor to start a continued story at the age of 74. Or maybe on second or third reading I'll see a clue I missed that satisfies my objections.

Meanwhile, I suggest you go get a copy of *Friday* and have a good time with Armageddon on its own terms.

And speaking of the end of the world . . .

. . . you will find an astonishing amount of death and destruction, along with advice on how to survive certain kinds of same, in Dean Ing's aptly named new collection, **High Tension.**

Analog readers (as opposed to digital readers?) will surely remember Dean's *Anasazi,* which just missed the Hugo ballot last year, or his ingenious "Portions of This Program—." Faithful readers will remember him as far back as 1976 in the paperback "thirteenth issue," *The Analog Annual.* Especially faithful readers may recall a story called "Tight Squeeze" that ran in *Astounding* in 1954. I missed that latter, being occupied at the time in learning to add and subtract and so forth, but by the time Dean's second story ran literally alongside one of my own in *The Analog Annual,* I was perfectly situated to appreciate it. I received the galleys from Ben Bova the day after I had major chest surgery, while I was stoned to the follicles on sweet sister Morphine and the relief of survival. Dean's "Malf" ran over me like a steamroller—a feeble metaphor, actually, since a mere steamroller wouldn't have lasted a minute in that story. Its centerpiece, the Magnum (named after Dean's personal car, which is several stories in itself), is one of the most awesome technological juggernauts since Keith Laumer's Bolo Combat Units: a forest-harvesting machine which includes among its formidable features extensors with gangs of outsize chainsaws. When it is seized and run by a madman it becomes a terrifying instrument of destruction—which I understand you will see pictured on the cover of *High Tension.* The whole collection is high-powered—as Heinlein once said of another book, they ought to supply a whiskbroom with every shot, so that the customer can brush off the sawdust when he gets up.

Dean is not one of the century's great prose stylists (nor is he trying to be). As Algis Budrys once said of another writer, his style is like a safe falling off a fourteenth-floor balcony, carrying all before it in its headlong plunge. He is particularly prone to so-called "said-bookism," in which dialogue is rarely simply "said" but instead "snarled," "chuckled," "grated," "frowned," and the like. Myself, I have no violent objection to a limited amount of this—people don't always just *say* things, sometimes they do snarl them or whatever—but I do have trouble, for instance, with a character "hissing" a sentence which contains no sibilants, or a line like " 'It's a wonder your heart can take it,' she sniffed." The overall effect is rather like a play with slightly purple dialogue (" 'Spare me your ripostes,' she said, 'people are dying while you wax clever.' ") which nonetheless you find you cannot get up and walk out on because the *story* is so goddamned interesting and the pace so absorbing.

Dean is a confessed didactic writer:

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he shamelessly admits that he writes because he has sermons to preach, messages to deliver—which he sugar-coats with entertainment so that people will swallow them. I think what I am trying to say here is that, while the quality of his sugar-coating is perhaps not up to the subtle standards of, say, Entenmann's, nonetheless it is a couple of cuts above raw Oreos (somewhere in Pepperidge Farm country), and the inner content of message is *much* more nutritious than will be found in the most refined baked goods. (His novel *Soft Targets*, for instance, is based around a plan to combat terrorism that could actually *work*.) You may not offer this book to the Chairman of your English Department to convince him that SF can be Great Literature—but you'll have a hell of a good time reading it, and learn a few things too.

Almost all the stories and articles in *High Tension*—"Domino Domine," "Vital Signs," "Liquid Assets," "Why Must They All Have My Face?," "Fleas," "Gimme Shelter," "Living Under Pressure," and "Vehicles for Future Wars"—were originally printed in *Destinies*, Jim Baen's noble experimental attempt to sell a magazine format to confirmed paperback readers with a "paperback bookazine" (for which I contributed some half-dozen review columns). *Destinies* sold as well as any magazine, but that is not good enough for a book; sadly, it is defunct. It would seem that Dean made good use of it while it lasted, or that Jim made good use of him, or both. Only three of the pieces in *High Tension* appeared elsewhere: the above-mentioned "Malf," "Banzai," and "Down and Out on Ell-Five Prime."

Yet somehow Dean seems quintessentially an *Analog* writer—any one of these stories might well have sold to John Campbell, and the fact articles in particular—on civil defense tactics for nuclear war, and on future vehicles of war—would have seemed right at home in these pages.

So *High Tension* ought to be right up your alley—and you can probably expect to see a lot more of Dean in *Analog* in days to come.

One last toot before I go. Sign of the Times department, an anecdote which may serve in part to explain why writers are sometimes observed to bite pieces out of furniture, or hurl typewriters through windows.

Last week I was buying milk at the local Green Gables outlet, and there on the paperback carousel was, oh wow, a major new novel by . . . well, no point in naming the author. Let's just say that I have found this writer to be *so* reliable a returner-of-the-penny that I greet his latest with the same joy I would bring to, say, a new Ted Sturgeon or John MacDonald. Automatic purchase: I snatched it up, reading the blurbs as I approached the register, already savoring the first tastes . . . and my eye fell across the price.

Three-fifty. Plus tax.

About-faced so suddenly I nearly threw my back out, replaced the book with the greatest of reluctance in its little wire pocket. Where, given the average clientele of the Green Gables store, it will languish in loneliness for a little time, until someone comes to tear its little cover off and throw it into the dumper. I *wanted* that book—still do—but

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I damn it don't have the price of three dozen eggs to spare. So I'll wait until it comes to the library, and one day that major author who just published a terrific new novel will discover that *he* doesn't have the price of three dozen eggs either.

Now: as I replaced the book, I absently noticed around it three other titles from the same publisher, all by new or unknown writers, all more moderately priced than the one I wanted. But I didn't *know* if I wanted them, so I left them too. When I got home, intending to order the biggie from the library, I found a package in the mail—review books from that very publisher! I was still on their review list! I tore open the package eagerly. It contained copies of the three lesser books. Period. The big one was too expensive to mail out to reviewers.

Okay, perhaps those other books "needed" a review and the blockbuster "didn't." (Tell that to the guy what wrote it.) But they were sent simultaneous with publication—there is no sense me even discussing them here, they'll have been pulped months before you read this. So the *next* blockbuster that publisher releases will have to cost *four* dollars.

No: four-fifty. Because the next day, and the day after that, identical packages arrived from that publisher.

Anybody want to trade a second-hand copy of a real good book, for three copies each of three murdered hopefuls? Murdered by organized incompetence that victimizes equally the beginner, the old pro, and the reader?

If I'd of stayed a night watchman, I might be up to six or seven bucks an hour by now. ■

IN TIMES TO COME

● Next month we lead off with a bit of an experiment: an excerpt from *The Descent of Anansi*, the new novel by Larry Niven and Steven Barnes. Analog doesn't usually publish excerpts from novels, unless they happen to be detachable modules which stand as completely independent novelettes or novellas. The circumstances this time were special; I won't attempt to go into all the details, but just say that it wasn't practical for us to do the whole thing, but the story is one I think you'll be interested in, even if we can't print it all. It starts with a problem that may not be all that far in the future....And Val Lakey is doing the cover.

Our fact article will be "The Inner Five," one of George W. Harper's thought-provoking pieces on astronomy—in this case, the origins of the Moon and the other inner planets. Astronomy is the oldest science, but some of its oldest mysteries are still far from closed.

The story line-up will include at least one new writer you'll want to watch, among others already familiar.

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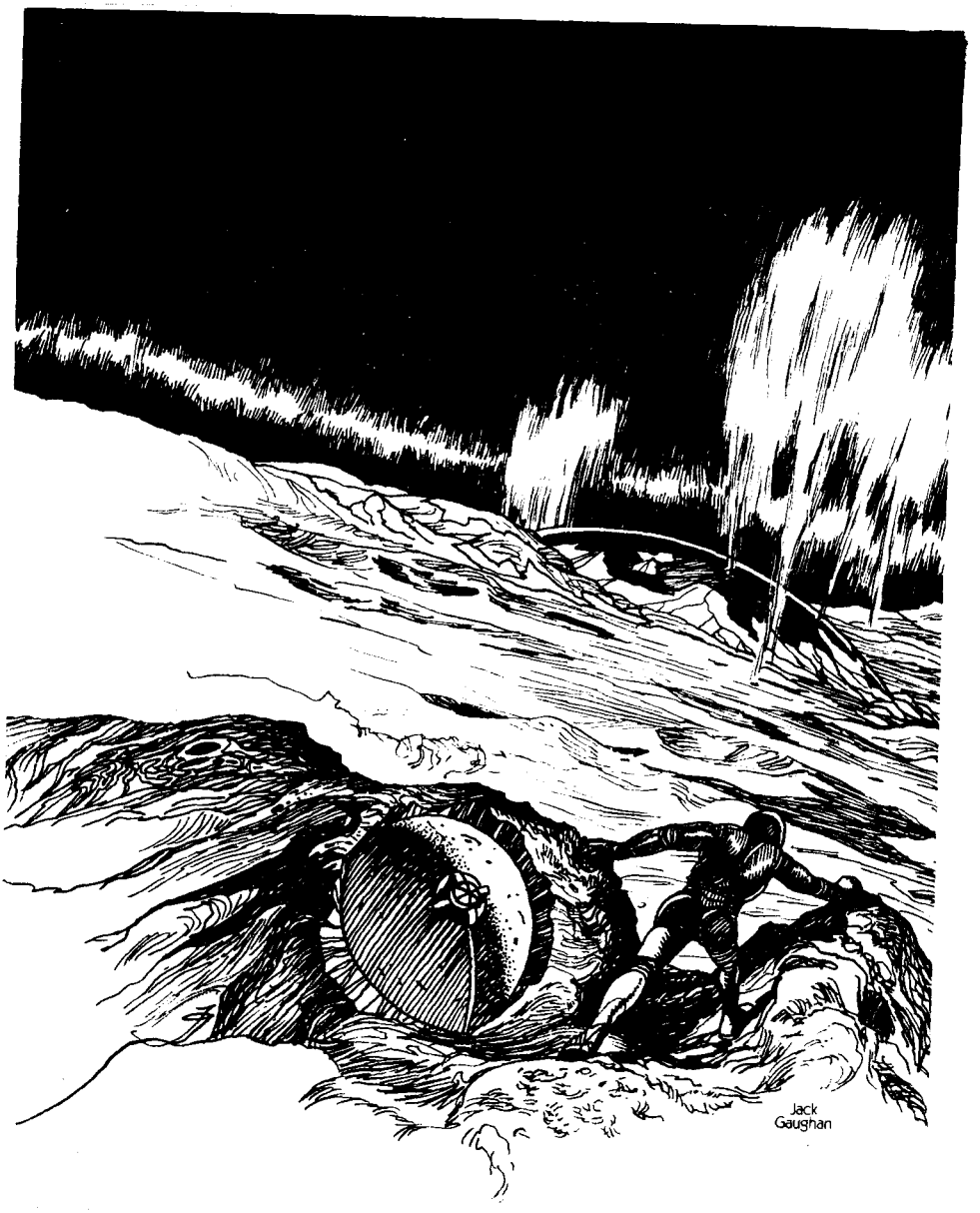

A man can react only to
his perceptions of reality.
And if he has nothing against
which to check those perceptions...

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Mark McNeil

SCRATCHES IN THE DARK

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Standing under a vast starfield, the man shivered in the cold. He looked up, recognizing the constellation Draco in the sky. The constellation was growing brighter, changing, becoming malignant, as a pale green luminescence grew around the stars. The image was out of focus, slowly crystallizing into the crisp outline of a dragon set back on its haunches, its foreclaws raised to strike. Then, like lightning, the dragon's foreclaws slashed through the air, the stars erupting in a flash of white. An icy wind exploded from the heavens, propelled by the white flash. The man felt himself whisked into the air, being drawn into the vortex raised by the storm, rapidly descending into the depths that receded, dropping away. The vortex dwindled. Suddenly the man stood on a dimensionless plain, shadows surrounding him. The spectres floated into the air, then dove back from the sky, falling like locusts, crushing into him, smothering him. . . .

Jason Savin jerked awake, his jaw muscles stretched taut in a silent yell, his arms stretching back the nylon netting holding him in bed. He reached for a towel on the wall. He breathed slowly, rubbing his face. It smells sour, he thought, pushing the towel into the laundry compartment in the wall.

Unfastening the netting, he floated free from the bed and pushed off toward the open doorway, into the shadows of the main dome. Dim red light filtered into the dome from the hatches spaced around the perimeter, criss-crossing, creating a complex interplay of light and dark. Reaching the control console, he rubbed his face again. His eyes were red, heavy, stinging with unseen dust. He was exhausted.

He spread his fingers over his face, peering between them, watching the shadows on the wall. One shadow seemed darker, deeper, more pronounced, curled like a body on the floor. Jason froze, staring at the shadow. Quickly he turned on the overhead lighting. The shadow disappeared.

Jason glided through the hatch, pulling himself hand over hand along the hooks on the protruding ribs forming the structure of the corridor. Red lights, unevenly spaced between the hooks, disappeared ahead as the corridor curved downward, following the shape of the small planetoid. The lights flickered slightly. Jason looked at them apprehensively. He did not like the idea of traversing the corridor in darkness. He hated the dark.

The shadows continued to move, interacting, as different lights flickered, dancing ominously between the ribs of the corridor. Jason hurried.

Reaching the instrument pod, Jason slid through the hatch into the small dome. The starfield shone brilliantly through a single portal in the ceiling. The interior of the pod was covered with dials and meters and several sets of calibration controls. Glancing briefly at each of the smaller sets of dials and meters, he replaced a few recording chips with blanks, the removed chips to be stored in the shielded vault in the interior of the planetoid, there to await the periodic visits of the supply shuttle.

Jason turned to the larger calibration controls which maintained the alignment of the force field, protecting the delicate instruments of the Outstation from solar radiation.

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As he released the locking mechanisms to begin realignment, he heard faint scratching sounds on the wall. The scratching slid down the wall, like something trying to get in. Behind him the red lights in the corridor flickered. Hurriedly, Jason calibrated the force field controls, his heart pounding. His sudden fright surprised him. His hand was shaking; he could not get the needle centered; it kept jumping. He told himself that the calibration was close enough, his eyes darting over the other controls, pronouncing them adjusted. He quickly left the pod, not noticing that the scratching had subsided, along with the flickering of the lights. The noise was harmless, Jason told himself, just a sound. Nothing can live in a vacuum on an icy piece of rock.

Jason calmed himself by checking the seals on his spacesuit, then resumed examining the exterior surface of the instrument pod. Long, curving scratches were laced across the surface. Deeper, rounded gouges seemed stabbed in the ice deposits on the ground. Jason thought about what could have caused the scratches. About something that could exist without air or warmth, on a small planetoid. Visions passed through his mind—memories?—of something unseen. He closed off the thoughts and returned to the airlock, disturbed by the lonely, hoarse sound of his breathing as it echoed in his helmet.

Jason turned off the transceiver. Main Station had been unhelpful, listing a variety of possible causes for the flickering lights, but in the end they had emphasized the necessity for regular realignment of the force field. Jason *had* realigned the fields—not as often as recommended, perhaps—but then, he knew something they did not. The scratching noises. He woke up to them, heard them in his sleep. They grew increasingly persistent, daring him to venture into the corridors, where he was vulnerable.

Remembering his earlier communications, Jason thought uneasily of Blake, the commander of Main Station. Jason did not like talking to him. Blake was an angry man, dark, heavy-set, with a swarthy complexion and an edge in his voice like fingernails drawn over a chalkboard. On his voyage out, Jason had talked briefly with him, but Blake had been more interested in piloting the ship, hadn't wanted to be bothered. The conversation had made Jason dimly aware that Blake must have been in space for years. He wondered how long Blake *had* lived in space, virtually alone, separated from the rest of humanity by technology and a gulf of emptiness. He must have been one of the first out when the European Defense Agency had established the alien detection system: a series of Outstations camouflaged among the floating debris of the asteroid belt.

The Outstations had been created following the Summer of Destruction. The United States, South America, Japan, parts of China, the South Seas, parts of the Middle East, and East Africa had been devastated by waves of massive earthquakes. The quakes had followed a pair of monstrous quakes that all but ripped apart Peru, sending tremors around the world, triggering many other quakes. Europe and the USSR, though, had survived relatively unscathed.

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And rising in the wake of the disaster: the Prime Minister of the European Parliament. His revelation of the terran presence of aliens, corrupting society, brought him to worldwide prominence. He had produced the recovered fragments of a ship from space, a ship with weapons of tremendous destructive power. Jason had been fascinated by the ready ease with which people accepted this new theory. Perhaps people preferred a direct threat. Eventually, many people took to watching the sky for signs of the aliens, for signs of the *enemy*.

In the end, no world leader could fight the growing war fever. And no one could deny the unparalleled charisma of the Prime Minister as his power and influence increased. Around the world, financed by the economic power of Europe, his programs ameliorated the misery of people. He was a true humanitarian. Even so, Jason shuddered at the thought of one man with so much power, though the Prime Minister was apparently benevolent. He hoped he was the savior that humanity needed.

Jason reclined in bed, holding the remote control to the video monitor. On screen was a delayed tape from Earth. He pressed a button on the remote control.

—click—

The sound of heavy breathing and the dull beat of drums throbbed from off camera. Four men and six women, all naked, writhed on the cushion-covered floor, surrounded by spotlights and cameras. A man wearing a red felt beret and holding a riding crop gestured commandingly, and the actors obeyed, alternating positions. The director grunted approvingly, stepping behind the camera. After several further instructions, the director stepped back, announcing, "That's a wrap!"

From stage right, the MC walked onstage, lights flooding the previously unseen studio audience. The MC shouted, flashing a toothy smile.

"Well, that's his fantasy!" He looked to the audience, soliciting a judgement. The audience, composed mostly of teenagers, whooped and whistled enthusiastically. The MC continued, marking with a grease pencil the highest level achieved on the applause meter. Then the MC announced, "Next on *My Fantasy Is* . . . Cynthia Stöwahl, from Eindhoven, the Netherlands."

The audience clapped.

—click—

The screen went blank.

Rising from bed, Jason left the chamber, moving toward the kitchen. As he passed the hatch on his left, he noticed the corridor was dark, except for a dim light filtering through from the pod at the end. Each of the other corridors were dark too, he noticed, as he turned around. He went to the control console, activating the overhead lights. He opened the link to Main Station.

Blake responded.

Jason told him about the dark corridors.

Blake paused. "I don't understand what could be the problem. You've been realigning the force field, right?"

Jason could not bring himself to respond.

Conscious of the lengthy pause, Blake accusingly repeated, "You *have* been realigning the force field, *right?*"

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"Well," began Jason, sheepishly, "I might have forgotten a few times. I felt sick for a while, you know, because of the weightlessness."

"Come on, Savin!" yelled Blake, the small speaker of the transceiver distorting with the volume. "This isn't a simulation, this is *real!* You could die! Get off your damn ass!"

Jason started at the word *die,* surprised by Blake's vehemence.

"The field *must* be kept aligned properly, *just off* the surface. If the field contacts the surface, its energy is bled off attempting to repel the mass of the planetoid. The field generator is only designed for radiation and overloads easily, allowing solar radiation through, damaging the station.

"You know, you've picked a really stupid time to do this. I can't play hero and rush out there to save you. I've been busy the last few hours alerting the other stations about the projected increase in solar storm activity and the resultant hard radiation. I can't take the ship out; its shielding isn't adequate. You're just going to have to make do."

Blake's comments stunned Jason; he had expected help.

Harshly Blake continued, "Listen, Savin, I don't know who chose you for this post, but as soon as the solar storms subside, I'm sending you back to Earth. That is, if you survive."

Blake paused. Quietly, a tone of misery edging into his voice, he said, "I don't mean to sound so heartless, but you had better wake up. No one's going to help you, at least for a while. You're alone, but not helpless."

Blake let the silence crackle on the open line for a moment, then added, "Savin, say something."

Jason responded, "I understand . . . I'll try . . . I will," more to himself than Blake.

"Good!" said Blake, loudly. Then, abruptly, he added, "I have to finish warning the other Outstations. Blake out."

Jason clicked off the transceiver.

Jason looked into the dark corridor. Not even light from the pods cut its depth. The computer had evaluated the output of the solar cells—they were failing, irreparably damaged, barely able to support the environmental systems of the main dome. Jason had yielded to the inescapable: he had shut down the lights. Now he held a flashlight; he must adjust the controls in the pod to avoid further damage and the total failure of the cells. The dark frightened him, but he had overcome his fear for a time, inspired by his conversation with Blake two days earlier. But, alone again, he dared not waste energy blasting a signal over the heavy background radiation just so he could talk to Blake. And, as the lights and instruments failed, the scratching returned, growing louder, more predatory.

It seemed to sense his vulnerability. Jason began seeing apparitions in every shadow. He told himself that it was his fear, but his heart pounded nevertheless. Something was warning him. Each new transit of the corridor brought him closer to hysteria, to a plateau of fear he was unwilling to face. He knew the plateau existed; he felt the rising walls every time he entered the darkened corridors.

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The walls held him, protecting him from the unknown.

Jason entered the corridor, grimly maintaining a fragile grip on his emotions, on the part of him that screamed for release and escape. As he pulled himself along the hooks, an inexplicable sour odor filled his nostrils, accentuating his fear. The beam of the flashlight jerked awkwardly, creating a harsh effect of light and dark—separated by a sharp line, with no diffusion.

As he neared the hatch to the pod, sharp scratching noises became more and more apparent. Shining the light ahead, Jason saw the gleaming reflection of the flashlight in the glass port of the hatch. When he pointed the light away, the port was transformed into an empty hole, deep and black.

He opened the hatch slowly, pushing the light through, shining the light on the interior of the pod. Descending into the pod, Jason felt the slight draft of icy, cold air. Quickly, nervously, Jason adjusted the force field controls, then pulled himself rapidly out of the pod, almost bashing his head on the frame of the hatch. He streaked down the corridor, hand over hand, bruising himself on several sharp corners. He returned to the main dome and went on to the next corridor.

Two days passed.

Jason was stretched out in bed, watching another replay of *My Fantasy Is*. The intervals between trips to the instrument pods had grown steadily. His eyes were blank, unseeing, mesmerized by the rhythmic motions of the forms on the screen.

A sound intruded: a buzzing on the control console, and then the voice of Blake repeating, "Savin, are you there? Your telemetry has gone dead. Come in, dammit!"

Jason did not move.

Then silence.

Then a faint scratching sound moving along the side of the dome, gradually growing louder. Jason finally became aware. He clicked off the video monitor. Listening closely, Jason looked frightened. The scratching grew insistent, seeming to Jason hungry, the sound of a beast starving, but smelling food. And starving beasts lack normal reason, normal caution.

Jason pulled himself through the door and toward the control console. He saw that four of the six pods were not functioning, though the radiation in the main dome was still barely in the green. He shut down the power to the pods. He sealed each of the hatches. The output of the solar cells was diminishing alarmingly.

He felt certain now that something lived outside, some kind of creature, something stalking him. Perhaps, he thought morbidly, it relishes the fear of the prey—a true predator, preying on anything, enjoying the blood-lust of the hunt.

A long, scraping, mournful sound grew and slid down the side of the dome. The scratching seemed to wail, tearing at the metal, clawing at the wall. Jason listened intently as the scratching moved, circling, then gradually faded. His hand hovered over the controls for the exterior camera, but he could not bring himself to touch the controls, to view the horror he knew awaited him.

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His hand continued to hover over the controls, shaking, then withdrew.

I'm going to die, thought Jason, the words not really penetrating his mind.

Jason pointed the fire extinguisher at the control console as the board crackled with electrical flame, smoking. The radiation alarm was screaming, the piercing sound reverberating in the dome. The odor of ozone filled the air. Overhead the light ring flickered, then went out.

Jason was alone in the dark. The scratching continued abrasively. He was hysterical. The extinguisher floated free from his shaking hands, Jason unable to grip it any longer. He could not face it any more. He could not face the agonizing torture of awaiting the coming of the predator. Jason decided to surrender. He would seek death.

He crawled through the hatch in the floor, moving into the core of the planetoid in a daze, perceiving things through someone else's eyes. He focused on his hands ahead of him, pulling his way along slowly, his hands seeming distant, unreal. Jason passed through the dual internal hatches of the inner core, then entered the dock chambers.

He pulled a spacesuit from a locker. Sliding on the suit, he snapped on the helmet and gloves and seized a handjet. He entered the lock and sealed the inner hatch behind him. The air hissed from the chamber, and Jason opened the outer hatch. Using the handjet, he glided outward, emerging in the dark over the surface of the planetoid.

Jason kept close to the surface, passing near the strange, luminescent deposits of ice. He circled around the planetoid, nearing the boundary between light and dark. As he broke into the light, the main dome became visible and an eerie sight curved into view.

The faint blue arc of the force field hovered near the surface of the dome, bending the starlight, distorting it like crystal as it passed through the field. The field glowed brightly where it contacted the surface of the planetoid, dissipating its energy in the rocks and ices. The ice deposits steamed and spurted like geysers, driven by the energy of the field. The geysers shot out violent jets, propelling grit and small pieces of rock, lashing the surfaces of the Outstation, causing the scratching sounds. And the solar radiation streamed through, unhindered by the now useless force field, its energy drained into the surface deposits.

Jason had never seen anything like it before. It was new to him, unusual. *I couldn't have known,* he told himself. He drifted on, the handjet off, studying the fierce scene of escaping gases: an unearthly scene, a vision of hell.

Jason was dumbstruck, shocked. He paused, observing the surface tortured under an indifferent sun. Then he pivoted using the handjet and headed back, returning to the lock.

Inside the dock chambers, Jason removed his helmet and stood facing the locker, considering his actions. He had nearly killed himself with his fear of the scratching. The venting gases had become animated in his mind, forming a monstrosity. The gases became the dragon of his dreams. His fears were the bone and blood, the cold heart of the dragon, its ravenous appetite fed by the network of lies forged in his mind.

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He had been unwilling to seek the truth beneath the illusion. *And I was going to surrender to it,* he thought.

As Jason floated in the dock chambers, he heard a scratching sound on the lock, something moving along the exterior surface. Then a rattling sound like metal against metal. He froze, watching the sealed inner hatch.

Minutes passed.

The air pressure gauge began dropping, the air slowly hissing from the lock chamber.

Quickly, Jason donned his helmet, frantically trying to decide what to do. *Could I be wrong?* he thought. *Could something exist out there? That's the* dark *side of the planetoid—no radiation—and* something's *manipulating the lock controls. It can't be anything known, not out there.*

With horror, Jason thought of an explanation: the creature must have been watching him, seen him operate the lock, then followed, coming after him. *But why didn't it attack when I was outside?* Jason could not think of an answer. He shrugged off the question.

He reached into one of the other lockers, pulling out a pulse-laser rifle. He moved to the inner hatch of the lock, then backed away, hearing the outer hatch scrape as it opened. He switched off the lights, then wedged himself in an open locker facing the hatch. The chamber was completely black. He heard the outer hatch scrape shut, then the hissing of the air entering the chamber. His hands shook, gripping the rifle. The hissing stopped and the hatch wheel began to turn slowly. The hatch began to open, swinging inward. Jason looked where he knew the chamber to be, thinking he should see the stars through the port in the outer hatch. But something blocked his vision, a dark shape, hardly visible. It moved toward Jason.

Blake brought the small black ship up alongside the dock. Not designed for normal docking, the ship had to be secured somehow; Blake fired two magnetic tether lines, the magnetic cups at their ends hitting, then dragging along the dock, bringing the ship to a halt. Blake unstrapped himself and slid out of the cockpit, emerging over the dock.

He looked back at the sleek black ship, designed for speed, *ArcFire* stenciled across the bow. Blake was thankful the ship had become available, though it had still been risky attempting the rescue in the solar storm. With the extra fuel tanks, the ship had cut the transit time by two-thirds, making the radiation risk marginally tolerable, if not safe. But, Blake thought, I owe it to Savin . . . though he couldn't explain to himself why.

Blake reached the outer hatch of the lock and depressed a button, evacuating the air in the chamber. He opened the hatch and entered the chamber, closing the hatch behind him. He then repressurized. The chamber was dark, having no internal lighting. When the hissing stopped, he turned the hatch wheel, then pushed the hatch open. The dock chambers were dark as well. Blake stopped, unable to see anything in the blackness. He fumbled with the flashlight on his belt, trying to unhook it, moving slowly into the dock chamber.

Jason's heart pounded, sure that the creature sensed his presence. Jason

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waited, his finger pressing on the trigger of the rifle, seeing that the shape had stopped. The inner hatch was still open. Jason was gasping for air, hyperventilating, becoming light-headed. *Why is it waiting,* he screamed mentally. He could hardly hold the rifle, he was shaking so violently. He vaguely saw the dark shape move from side to side slightly.

Then a white light flashed in his eyes, blinding him. He reacted automatically, pulling the trigger. The laser pulse tore through the dark shape, then impacted against the outer hatch, blowing it away. Immediately Jason felt the air tear at him, felt the violence of the explosive decompression. The rifle was ripped from his hands, flying through the open maw of the outer hatch. Jason held on against the decompression, wedged in the locker.

Then the dark shape was gone abruptly, shot out into space. The decompression raged fiercely, then began to lessen, dissipating; then was gone. Jason stayed in the locker, staring out the hatchway at the starfield, trying to slow his rapid breathing. He almost passed out. Finally he emerged from the locker, still dizzy, and sealed the inner hatch. He turned on the lights and repressurized the dock chambers. He stared silently at the inner hatch, seeing no sign of his battle, then moved away, toward the inner core.

Entering the inner core, he sealed both hatches. He then removed his suit and examined the instruments. He felt sure that the equipment and solar cells of the main dome were no longer operative. Jason flipped a series of switches, breaking all links with the main dome and sealing the inner core, preserving it as a lifeboat of sorts, a haven.

The auxiliary batteries would circulate air and maintain the environment for a month. By that time, he thought, the solar storms will have subsided and Blake can come for me. Jason turned off the lights, unafraid of the dark for the first time in weeks, and released his grip on the controls. He floated free in space, in the dark, surrounded by the multicolored lights of the controls blinking like stars.

Jason floated unhampered, clothed only in his green and blue overalls, safe in the womb of the inner core, anticipating rescue. ■

● The environment exacts a price for the survival of the fittest; it captures them. When animals like Grevy's zebra were adapted to the dry savannah, it became a trap in time as well as in space; they stayed where they were, and much as they were. The most gracefully adapted of all these animals is surely Grant's gazelle; yet its lovely leap never took it out of the savannah.

Jacob Bronowski, *The Ascent of Man*

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The Alternate View

THE VOODOO SCIENCES

Jerry Pournelle

"I wouldn't know anything about politics," my friend said the other day. "I'm only an engineer."

He happens to be a very good engineer, but he named his profession as if ashamed of it. I see this a lot. The social scientists are automatically assumed to know more about society and politics than the hard scientists—even when the subject matter is something like nuclear power.

I wouldn't be so sure.

I hear a lot recently about "voodoo economics." The term is most often employed by Democrats in reference to President Reagan's economic policies, but I've also heard professional economists use the term "voodoo economics" in a way that implies there is a real science of economics in contrast to "Reaganomics."

Certainly the official policy is that economics is a science. We have by law a Council of Economic Advisors to report to the president, while the Congress has Alice Rivkin and her staff of economists to tell them what they should do.

From all the evidence I've seen, we'd do as well to give the president a Council of Voodoo Practitioners, and let the Congress consult its Chief Astrologer. In fact, I suspect that a chief *hungan* and *mambo* would do less harm than our present economists: we'd be less likely to take them seriously. However much our Chief Voodoo Advisor protested that his work was scientific, we'd demand some kind of track record, some evidence that his predictions might once in a while come true; while we impose no such burdens on economists, which is just as well, since their track record is one of universally dismal failure.

One of the first things they teach stockbrokers is to stay out of the stock market. Brokers make their pile from selling advice, and from commissions on stock transactions. They can't predict the market, and few risk their own money. They, at least, only affect their clients' fortunes. Economists, though, can ruin the lot of us with their advice—yet if no science can predict a relatively closed system like the stock market, how the devil are you going to "fine tune" something as large as the American economy? I'd think it arrogant to try; as arrogant as the man with three illiterate drug-addicted spoiled brats writing a book on parenting.

But there's worse to come: to the extent that there is a "science of economics," its practitioners must behave in ways that other professions would brand unethical. Example: The Corporate Economist of a large aircraft company is going to give a speech. He has made his analysis (cast lots? examined tea leaves?) and he foresees nothing but bad news. We're in a "downside cycle" and

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there ain't much to be done about it. So he goes to a meeting of, say, the airline owners, and of course when asked for his predictions he gives his honest professional opinion—

In a pig's eye, he does. If he told what he thinks is the truth, he'd be fired. Worse, the Securities and Exchange Commission would look at all his financial records and probably charge him with manipulating the value of his company's stock. It would be sure to fall, and if he'd prudently sold any shares recently he would likely go to jail.

No: his speech is predictable. He'll give some nodding acknowledgment to current hard times, predict an upswing, and tell his audience they better be prepared to buy a lot of airplanes.

Dr. Milton Friedman has a Nobel Prize in economics; one assumes he must know something about the subject. He once said, "Every economist knows that minimum wages cause unemployment. That's not a principle, it's a definition." The logic seems clear enough, at least when applied to home economics: if I can get the yard cut for a couple of bucks, I'll pay it; raise the minimum wage to $7.50 an hour, and I'll cut it myself. Whomever I'd have hired will go jobless.

Of course not all economists agree with that. After all, it's not only possible, but *likely* that the Nobel Prize in economics will go in alternate years to people who disagree on nearly every fundamental. I have a textbook on macroeconomics, and every chapter essentially cancels out the last, as each "school" presents its theories—and proves the others wrong.

In point of fact, the economists don't have the foggiest notion of what's wrong with our economy or what to do about it; and the very best economics textbooks have almost nothing to say about science, engineering, research, development, and technology.

Arthur Schlesinger Jr. recently said, "The collapse of economic analysis is demonstrated by the hopeless cacophony of economic forecasting, where experts generally disagree with each other and nearly all turn out wrong—a circumstance that, alas, discourages neither economists from making forecasts nor the rest of us from believing them."

So: will someone tell me what, other than one's political preferences, is the difference between "professional" and "voodoo" economics? And why we pay a Council of Economic Advisors while neglecting to have a Chief Astrologer?

Go to any U.S. university. You will hear lamentation and wailing and gnashing of teeth. Washington has become unfeeling and stupidly refuses to support higher education: don't those idiots on the Potomac know that education is investment in the future? Don't they know that human resources are our most valuable resources, that public higher education is necessary preparation for a democratic future? That we must invest in the future?

But now wander about the campus, and look at how our typical university allocates that all-important investment dollar. You will find that the "social science" departments are far larger than the "hard sciences," and indeed have more students than are enrolled in liberal arts. You will find that even in states

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with tens of thousands of unemployed teachers, the Department of Education is among the very largest departments on campus.

The social sciences will be large and important departments, with many members of faculty and much classroom space. One wonders what it is that graduates in the social sciences are prepared to do. It must be an important skill; we are spending a large part of our scarce but all-important investment funds to acquire it. Oddly enough, though, we're not training so many engineers and scientists, physicists and mathematicians. Why?

But of course the answer is well known. In most universities, our educational investment funds are allocated by entering freshmen. They go to a kind of oriental bazaar, where they are seduced into choosing a major; the number of majors then determines the department's share of the university's budget funds. It does seem an odd way to allocate an important resource.

One might suppose a better way: that the legislature, or other public authority, determine the number of engineers, biologists, physicists, medicos, sociologists, etc., that might reasonably be required in future, and allocate public funds among the departments accordingly. Students wishing to declare various majors could so do; but when the number that the taxpayers will support is exceeded, the next student to enroll in that major gets to pay tuition accordingly. If tax-supported higher education is an investment—and what other theory justifies sending the tax collector, policeman, and ultimately the public hangman to extort the funds from the taxpayers?—then might we have some care in the way that investment is allocated? The present scheme looks like a bad parody invented by an inept science fiction writer. Who'd believe it if it weren't happening?

At least, though, the present scheme should give us plenty of social scientists, as well as lots of professional teachers. With all those behavioral scientists we shouldn't have any problems teaching the young to read and write: even if the teachers have problems, the sociologists and psychologists can devise a scientific education program.

Only they don't. They don't even try. And when someone does succeed, as for example Marva Collins of Chicago, who built quality private schools in what she called "the allegedly fetid ghetto," the "professional educators" put out reams of material calling her a "hoax" who was "carefully constructed as a media event." It really infuriates the educational professionals to find someone able to do the job they claim they can do.

Mrs. Roberta Pournelle teaches in a juvenile detention facility. Her students are teenage illiterates. Most of them come with five pounds of paperwork that definitely *proves* that this kid cannot possibly learn to read. The schools, the psychologists, the educators haven't failed; there's something wrong with the kid. Roberta throws the paperwork away and teaches the kid to read. She hasn't failed yet.

Then there's the court system. In the history of trials, there must be about three cases in which the prosecution's psychiatrist said an accused pleading not guilty by reason of insanity was nuts,

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and none at all in which the defense's psychiatrist said he wasn't. Yet we continue to pay for this all-too-predictable "scientific" expert testimony.

This is professionalism?

And yet: we not only excuse gross incompetence among social scientists, we let them give real scientists and engineers an inferiority complex. Somehow we've swallowed whole the myth that you can be a well-rounded, educated person without knowing any science and mathematics whatever; but engineering and science majors are automatically uncultured boors, hardly fit for polite society.

We have a Council of Economic Advisors, and we debate economic policy, and everyone listens as these soothsayers pontificate about monetary policy; and meanwhile, the president's Science Advisor is a low-ranking White House official, there is no Engineering Advisory Council, and there is no cabinet-level post held by an engineer. More than a majority of seats in every major legislature in the land is held by lawyers, but there are about two engineers in Congress, and no cabinet-level post is held by an engineer or scientist.

Now go again to your typical university. Find an engineering student and a social science student. I'll bet you anything you like that the engineer will have read about as much history and literature and genuine liberal arts as the social scientist; while the social scientist will know nothing of engineering and physics, little of biology, and no mathematics. He may protest that he "took stat"; which will mean that he knows how to do cookbook calculations to produce the mean, median, and mode of a bunch of numbers. Given a little help he may also be able to compute the standard deviation; and with a textbook and a bit of luck he might even be able to do a "T" test, although odds are that he won't have the foggiest notion of what the T test assumes.

Go now to a rally protesting a nuclear power plant. There'll be a lot of students there. How many will be engineers? And how many social scientists? Of the social scientists, how many will understand *anything* of nuclear physics? How many will know the difference between ionizing and non-ionizing radiation?

Engineering students may apologize for deficiencies in "culture." The man who started the People's Lobby, the first of California's mass anti-nuclear groups, used to say proudly, "The only physics I ever took was Ex-Lax."

The fact is that engineers and scientists will have studied far more of the liberal arts than social scientists will have of physics or engineering. (And alas, neither will know any history.)

Isn't it time we ended this farce? Granted, the social scientists have a tough subject matter; but it isn't made easier by involving us all in a conspiracy to act as if they'd skills they just haven't got. It would be a lot easier to respect them if they made their students take hard courses: calculus through differential equations, *real* probability and statistics, operations research, basic computer science. Of course, if their students mastered those subjects, they'd probably get out of "social science" and into something useful. Meantime, though, they can stop trying to get the rest of us to act as if they know something we don't. ■

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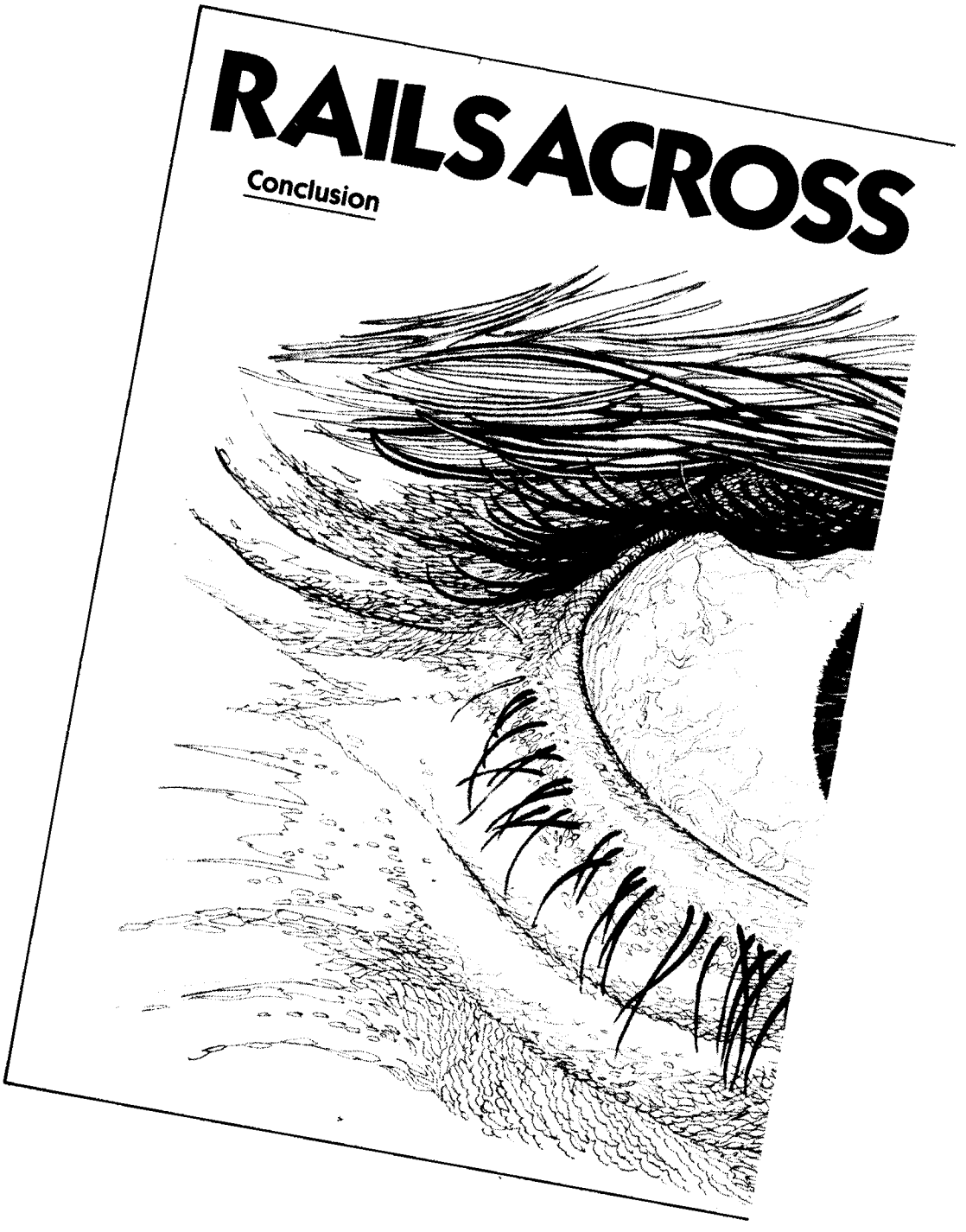
RAILS ACROSS

Conclusion



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THE GALAXY

Andrew Offutt and Richard Lyon

The trouble with going to someone Older and Wiser for help is that his ideas of what you need may be very different from your own.

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SYNOPSIS

At 0920 on July 8, 1853 Commodore Perry sailed the U.S. Pacific Fleet into Tokyo Bay. Until that moment Japan had been isolated, a microworld unto itself. The cultural shock of the uninvited visit toppled the Shogun and his entire class, destroyed classic Japanese culture, and transformed the island nation in ways previously inconceivable.

At 0300 on June 1, 1996 my left lower molar started to buzz. I'm **Irving Quinan** *and I was working my way through Harvard, then, as CIA agent-in-place. The dental noise heralded a communication from my mother. She is* **Gertrude Eisenstein Quinan,** *semi-retired master spy and charter member in the league of smother-loving Jewish mothers. CIA was disturbed, she advised, by a lot of phone traffic between Chinese and Russian observatories. Apparently it had all been triggered by a call from Harvard Observatory. I was to get on my bicycle and pedal up there to learn what was happening. And just at the start of final exams, too!*

(Thanks to the energy crisis and the exhaustion of other critical resources, a lot of us are on bicycles. The U.S. has been running in place for a long time now, not making quite enough technical progress to offset resource exhaustion. Life here slowly continues getting worse. In other parts of the world, things are really grim. In Mexico, for instance. So is the secret way the U.S. Immigration Service Police deal with illegal Mexican migrants: really grim.)

At the observatory I met **Professor D.S.P Berson,** *Ph.D., F.R.S., and N.A.S., who had just discovered . . . a straight line in the sky.*

The incredibly powerful beam of laser light was so strong that it was self-focused. Berson's explanation (?) involved something about the final stages of a pulsar. The part I paid attention to was his statement that the light beam was a short-lived phenomenon that could not possibly hang together long enough to be any real danger to Earth. Under Agency policy, that meant I should arrange a public announcement in a manner that would avoid panic. And just at the start of final exams, too!

Unfortunately I couldn't get the story into the Harvard Crimson. *My beautiful blond roommate* **Sonya** *(with whom I had gotten exactly nowhere, despite great effort), had taken over the paper and was gleefully-joyously running her idea of a far more important story. A gaggle of Harvard men (?) had set out for Wellesley on a DAPR—Direct Action Panty Raid—and, thanks to a Radcliff counter-raid, were now walking home* sans *dignity, trophies, and their pants.*

I did manage to boost the story into The New York Times, *gaining a post-grad job in the process. Then I made a phone call to my cousin on space station* Kennedy *(all us CIAs are cousins), and things swiftly got hairy.*

My "cousin" was happy to talk with Berson and me. What looked like a straight line to Earth-based telescopes was, with Kennedy's *greater resolution, a set of six lines in hexagonal array. Despite the fact that their power exceeded the total output of our sun, the lines were clearly artificial. We were*

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not talking about a short-lived natural phenomenon!

Suddenly the question of whether Earth might be on a collision course with them was of more than academic interest. Turned out we were. The glancing impact would merely slice off China. . . . Yet even before that grim news became public, it was outdated. The laser beams moved, *just enough so that we would miss them. Too, three of the six beams now showed color changes, a mystery that maddened the physicists. They resented having our world suddenly converted into an anthill beside a railroad track. While they and all the rest of us scuttled and scurried and opined and guessed, the laser beams* were. *And they represent powers vast beyond our comprehension.*

And finals continued, at Harvard.

Just as I finished my exams, every agent in the Boston area was called to a meeting at a CIA safehouse. That included me, CIA A.I.P. The sense of anticipation/apprehension was extreme. We knew that a NASA Mars probe had been diverted to flyby the lines and this meeting had to mean that their secret had been discovered.

It had, and it was a mindblower. My personal mental discomfort was not alleviated by the briefing officer's attitude, which, though he didn't quite say it, was "Really, this is only what we should have expected." His argument was that, since our sun is a very ordinary star, we should expect a galaxy with an enormous number of such stars to be heavily populated with intelligent races. Obviously they would want to travel, even though moving at near lightspeed required the use of vast amounts of energy. The laser beams were the obvious solution to their problem: they were the tracks of the Transgalactic Railway!

A Star Train accelerates by taking energy out of the light rails and decelerates by putting it back. We couldn't object to the sanity-boggling concept of a Galactic Railroad because he had the photos: a Star Train leaving the rails and on course for Earth. Not a missile—a train.

*On leaving the meeting, I picked up my orders. Decoded, they told me to watch the 0700 news—*and *relieved me of all duties. I was fired without even an explanation! I returned to our shared room and was sorry that Sonya was out. Her psyche is a labyrinth of twists—but O!—her soma! She was far, far too tied up with Women's Rights to make time for me, though. Her mental set was that all the world should be concerned with nothing else.*

At 0703 the network news was interrupted by a news conference: Our President. Dear old **President Fairborne** *advised the American people that indeed the Aliens Were Coming, but not to worry. Rather than land, they would orbit the Earth and we'd go up and trade with them—we being a joint U.S./U.S.S.R. team acting under UN instructions. After many inspirational minutes and the predictable quotations from Lincoln they all use to try to establish kinship with someone competent, the president invited questions.*

Would the CIA be involved in First Contact? No. While our team would include a representative from the Defense Intelligence Agency (DIA), the operation would otherwise be entirely a State

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Department "exercise." And what about press representation? Ah. One reporter would go along, having been chosen by lot.

All at once my termination by the Agency made a good deal of sense! The Company would thus give nominal obedience to the President's orders and, by fixing the lottery, still be represented.

Sure enough, within the hour my phone rang and by 2113 I was on a plane for Houston to begin astronaut training.

My fellow First Contact astronauts were: **Professor Judith Burkhalt** *of Princeton University's Linguistics Department, author of the astonishingly popular* English As She Is Spoke; **Professor Asad Bashir,** *eminent anthropologist who conveniently happens to be from Where The Oil Is;* **Katherine Myers** *of the U.S. State Department; old* **John Wareagle** *of DIA—who, I soon realized, had a Thing going with the astonishingly young and attractive Myers: and the Right Honorable* **Secretary of State Horace M. Windhorn.**

None of us was too pleased when we learned that basic astronautic training consisted mainly of toilet detraining. In space, you see, the mechanism that monitors the bladder doesn't work: it's gravity dependent. With no urge to go, you have to use your diaper by conscious act of will, and that indeed requires some training.

Windy—pardon me; S. of S. Windhorn—absolutely refused to wear diapers, which was "beneath the dignity of one second only to the president!" At last the space docs agreed to do for him what they did for the monkeys they still send into space, the monkey and the honorable S. of S. being alike in that neither can be taught to use diapers. (What Windy did not know is that NASA has this wonderful pump *that* attaches, *and when the pump's timer says you gotta go, you absotively posilutely gotta Go.)*

Somehow I think the world cannot expect much from Windhorn's leadership. That's bad, for we're clearly heading into a mess.

Even as the shuttle lifted us off, the U.N. was embroiled in a really ugly debate. The delegates have completely lost sight of the difficulties we will face and, imagining the Aliens as some sort of Aladdin's lamp, argue away over what nation's wish shall be granted. With every world state urgently demanding/"requiring" something that will ruin the economy of another nation, which in turn . . . the only agreement was that we should not buy medical technology that would lengthen life or otherwise lower the death rate, and thus worsen overpopulation. Eminently sensible . . . and the immediate result was the Old Age Riots.

Shortly after we arrived on the Kennedy *(I'd barely had time to get the bugs in good working order), the Russians arrived. That team was led by* **Deputy Minister, U.S.S.R., Stepan Shchurin.** *One member of the Soviet team especially interested me.* **Tatiana Vinogradova** *is a* Pravda *correspondent in exactly the same way I'm a* Times *reporter. She left their shuttle with two space cans of luggage and came aboard the* Kennedy *with only one. Hidden somewhere in all the junk that has accumulated over the years on* Kennedy's

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outer hull there's a can about the size to hold a strat nuke.

Just a little Russian precaution to make sure we don't try an under-the-counter weapons deal with our Visitors. Ordinarily I'd feel a mite uneasy about sitting on a nuclear bomb, but that unfortunately became minor in comparison to our other concerns.

John Wareagle grimly maintains that contact with a galactic civilization will destroy human culture in the same way the "white" men destroyed the culture of his progenitors, the American Indians. Kathy Myers's attitude is exactly the opposite. She sees Them as the salvation of an otherwise doomed world, on the grounds that only Outside Technology can save human civilization from collapse under the pressures of exploding population and dwindling resources.

While there is truth in what John says, I fear that Kathy might be right. It isn't likely that the Railroaders are running a charity. If we're going to buy from them—what's our coin? What's worth the cost of interstellar freight? According to the Moeller-Rand think-tank, it's to be expected on statistical grounds that the Railroad involves millions of civilizations, each of them billions of years old. So old, in fact, that they must all have developed to the limit of their potential. Humankind is probably the only immature civilization in the galaxy, the only race that hasn't yet decided whether to kill itself off or grow up.

What can we primitives offer such god-like beings?

These were among my worries the night before . . . humankind's Final Exam. When the Visitors at last came over, you see, things got worse. In order to slow to orbital velocity, the Star Train executed a perfectly controlled flight through Earth's upper atmosphere. It looked to NASA as if They and the Kennedy *were on a collision course. Panicking, Windhorn wanted to fire all the station's attitude control rockets. To restrain him I had to press—accidentally you understand—the emergency actuation button on his monkey pump. He forgot all about ACRs because he was busy being forcibly emptied.*

Of course what NASA saw as a collision course was, with our Visitors' far greater precision, only a close flyby. That didn't stop us all from preparing to join our ancestors, honorable or otherwise — which, in my case by the way, are Tibetan, American Jewish, and—well, Mom insists on Martian, ancient. Then the Train, all twelve cars bearing the secrets of the universe, pulled alongside the Kennedy, *and stayed there.*

Minister Shchurin, NASA **Station Keeper Harman,** *and I went out to meet and greet Them. In a historic moment—make that the more pretentious "an" historic moment—with all the world watching, we managed to make ourselves look pretty foolish while greeting two spacesuited bipeds and a sphere. We backed into them. . . . Back on* Kennedy, *one of the two bipeds turned out to be a magnificently beautiful creature we promptly dubbed* **Angel.** *The other was a bat-faced horror . . .* **Devil.**

Unfortunately for us, Angel proved to have no interest in learning our language or teaching us his/its. Devil, even

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though it was pathetically eager to learn and to teach, shows almost no language aptitude. That left **Sphere.** *It seems to be a language learner; a computer. Not teaching and learning, just learning. Sphere is a well-built one-way street.*

Such injustice wanted correcting. Tatiana and I decided to do a bit of spying. While the Train had some provisions for intruder detection, there was nothing that presented a real problem to a couple of darned good agents. We bugged the portholes on each of the Train's twelve cars with light-pipe cameras.

On the way back I made the big discovery. The door on one car was . . . open! I couldn't resist the temptation. The more pragmatic Tatiana could, but she dared not not follow/accompany me. We . . . met *an incredible collection of weird beings. A minor misunderstanding developed: I was challenged to a knife fight with a man-sized beetle who seemed to be suffering from a bad case of medieval knighthood. I won by being clever, which is what I'm best at.*

After that we began trading with those, uh, beings. Our watches. Our space kits—every tool and anything else we had except our suits and diapers—they wanted those too. In return we received a few baubles. . . . And returned to the Kennedy *with vast wealth in incredible interstellar gems. Heroes, surely!*

CONCLUSION

11: Me and the Devil

Space Operations Center *Kennedy* doesn't have a brig, but that's where I am.

I'm charged with the gross exceeding of my orders, conduct detrimental to humankind, *and* trading with Alien Beings in violation of UN resolutions. I sold a few dollars' worth of spare parts for millions in gemstones and it's considered the worst bargain since the Indians parted with Manhattan for $23.98 in colored beads.

Everyone's mad at me. Tatiana thinks I'm a "hero"; a fool who risked my life and hers. That's not to mention my betraying her entire nation in a few seconds' worth of semantic exchanges with the aliens. Linguists of both U.S.A. and U.S.S.R. are furious. Lots of others are furious, too, about the bugging of the Train. Windhorn remembers the incident with the monkey pump.

I am left with one friend. No, not John Wareagle. It's S.O.P. for an agent not to know his friends when they're in trouble. Colonel or no, Wareagle, DIA, is a good agent.

My only friend is a crimson-skinned, patchily black-furred, winged creature that looks like the devil!

We call it Devil, and Devil spends nearly all its time in the *Kennedy*. As soon as I was chained — chained! — behind the solar still, Devil began paying me long visits. Our conversations are even more inane than those at cocktail parties, since I've been able to learn only a couple of hundred words in its language. Those are mostly nouns, with a few adjectives. That allows such fascinating exchanges as "The ball red" and "Yes and the ball round." I can't even say "too" or "also" to make a decent sentence of that footless comment.

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Trouble is, no word or concept exactly corresponds. For example, to Devil an egg is not round, apparently because it rolls poorly. Likewise it can't grasp the idea of a day as an absolute length of time. To Devil it appears to be a ritual cycle of working, eating, and sleeping. Devil just can't conceptualize it. much less conceive the concept.

By now only the creature's appearance is intimidating, and maybe it's a shame we've tagged it "Devil." It's quite polite, so much so that it insists on being called by whatever nickname we find easy to pronounce. Its actual name is Sherthea, or something like.

Something interesting: it does agree that, in twelve of the *Kennedy*'s work-sleep cycles, Earth will be mighty close to the laser light rails. Our People suspect that the Star Train will have to leave then, and Devil seems to confirm(?). We have only a handful of days to establish useful communication. So far all efforts to exchange anything even approaching the abstract have failed utterly. The ball round!

It might help if I had more insight into Devil's motivation. Why is it so eager to communicate? Why does it insist on eating with us? Every day it brings a portion of its/their food which it trades for some of ours—which it then eats. That it can do this at all without coming down with the hyperzootic hyves or just plain death is miraculous enough to make biochemists consider seeking divine guidance. Devil's digestive system must take everything completely to pieces—but that doesn't explain the alien's motive.

Why, with foods it can eat and enjoy, does it trade for alien foods it surely couldn't be enjoying?

For that matter, why doesn't it eat more? It's all skin, bones, and muscle because it lives in deliberate semi-starvation. It can't grow a decent coat of fur because it's malnourished.

Wish there were something I could call Devil besides "it." Despite all the '70s and '80s huzzah about semantics-shall-end-sexism, English still doesn't have a sensible pronoun for someone of unknown sex because so many went ahead to opt for non-sensible and even insensitive ones. (I remember the sentence Judith Burkhalt quoted me from the radio version of *War*—no, that's *Star Wars:* "A person's got to have their dreams." Judith declaimed that one, shuddered, and departed. We can't be sure whether Devil is a she or a he, and surely Devil isn't a they. And if it's an it, so am I.)

I have had plenty of time to ponder that. I've had plenty of time to ponder other things too, including recent events down on Earth. Since I'm in the brig, I have to listen via bug to the others watching TV. It's even more frustrating than watching several telepeople watch a football game and talk about it on camera. From last night's NBC News I learned that college enrollment in the physical sciences is dropping—while law school applications have been skyrocketing. Sure. The students expect/fear that our Visitors will reveal just acres of technical secrets. Why should a bright ambitious student, or even the more normal kind, work years to get a degree or two in science-as-we-dumb-humans-now-know-it? Everything she

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learns could be obsolete before she graduates! Whereas and maybe even wherefore, the Law is a "safe" profession for himself. Or might that be theirself?

The bug also lets me hear my erstwhile cohort's comments on the news. Wareagle says the science-No/Law-*Si* phenomenon is the first harbinger of the coming disaster. We Earthlings have seen the superior Civilization of the Aliens and lost faith, he says; lost pride in our own culture.

It is, Old John raged last night, as if a man had to cut his lawn with a pair of scissors. Through necessity he could and would perform that painfully laborious task . . . until he sees his neighbor using a power mower.

Before ole John got much further he was embroiled in a furious argument with Kathy. Again.

As far as she is concerned he is wrong wrong Wrong—and even if he's right, it doesn't matter. (Could Kathy and Sonya have studied logic together?) In the first place he's wrong, Kathy insists, because Angel and Devil aren't "Things called Aliens!"

"They are not *things* called Representatives of an Advanced Civilization! They are *People!* IndiVIDuals! And they're entitled to be TREATED AS such!"

Thus spake Kathy, and I could hear that tiny fiery woman from the far side of the Station without using any of my bugs.

It doesn't matter in the second place, she argued, because whatever damage has been done to human pride is an accomplished fact. Not just the Church *and* Galileo were wrong; millions of others have mis-surmised. Earth isn't the center of the universe or even the galaxy, and neither is the sun—and we are not unique. Not only are we not alone, others are far more advanced than we.

The conclusion from her argument is obvious. We ought to recoup our losses and pride as best we can by trading with the genius Aliens . . . if we can.

No one mentioned to her that Cortez was a person too, an individual. No one wants to think about that, much less discuss it. Hmm . . . Cortez. Wasn't that Mexico? Or was it Peru? I can never . . .

The days slip through our fingers and the pressure of time builds.

The main effort to communicate, via the sphere, is making no observable progress. Stepan Shchurin is close to despair. Judith maintains that there *is* a key. Presumably she believes it's a linguistic one. So the linguist harries the uncommunicative machine called Sphere — and the non-linguist named Quinan "talks with" Devil!

Stiva and the others share a nightmare. The wealth of the stars could be ours for the asking, but the Star Train leaves in seven days. (Forever?) And we don't know how to ask!

Because of the extreme time pressure, they're feeding everything into the sphere. Everything. The station keepers' collection of *Playperson*. Every available textbook regardless of subject. Wads and batches of films and vidtapes. Hand-printed messages! Everything that we might use in trade, "we" are giving away.

"We," not I. I'm in irons. In irons!

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Come down off that space station, Mr. Christian! (Christian? Me? Buddha Saves!)

Because he's a technician, Shchurin is so afraid of technical failure—failure to communicate—that he can't appreciate other dangers. Windhorn does recognize the danger. So the weasel has objected to this Great Giveaway just enough so that the blame will fall on Stiva.

Everyone is in vile temper. Kathy Myers is the worst. She's degenerated into a state about as friendly as a wounded tigress. In moments of stress I, alone and far from them, hear her speech pattern slip! It's become obvious now that she's a Mexican! Born there, I think. Spent most of her childhood there. This puzzled me, for a while. How could an illegal possibly get herself on the First Contact Team?

On second thought it's only too logical. She did not get herself on the Team! Somebody put her on. As an illegal immigrant Kathy—Catalina, more likely—is horribly, pathetically vulnerable. One phone call and she's in the Deep Freeze down in old Carlsbad Caverns. That makes her subject to pressure and the control it can yield. And there are plenty of people in Washington who like to Play Games. She must have a happiness quotient about equal to someone divorced on 24th December.

I have my worries, too. The latest is that Sphere was fed a transistor radio and apparently learned all about it by disintegrating the thing. Judith—ever the true scientist—suggested dropping in a frog. Sorry, someone reminded her; no frogs until the next supply shuttle. So Tatiana proposed an alternative. Me.

Of course it was only a bad joke. No one would seriously consider such a thing . . . not so far.

It's astonishing that an obviously extremely bright person such as Irving Quinan has such rotten luck with better-looking women, but I try not to think about that. Besides, I'm staying busy. In irons! Devil and I have taken a real step forward.

A mutually understood abstraction! Devil brought a set of tools and we began to arrange them—a key, a lock pick, a hack saw, a sledge hammer, and a feather duster. And a job: opening a lock. Devil and I can agree on the order of the tools: the key first and the useless feather duster last. (What genius sent that thing up here, anyhow?) On other tool/job problems, we put the tools in the same order of suitability, with one exception. If a tool is *over* capacity for a job, say a power saw for something easily cut by hand, Devil ranks the tool as worse than useless!

I'm sure that's a valuable key to the mind and culture of this particular alien. It is not, unfortunately, any sort of key to the sphere.

Devil and I made this breakthrough just before dinnertime. In my excitement I didn't notice that no one had bothered to bring me my meal. Devil noticed, and Devil became highly agitated, in nice phrasing. Nothing would do but that I use the hack saw to cut free of my chains. I argued just a little. We should try to get along with the Aliens, shouldn't we?

I had just begun this unplanned jailbreak when along came gliding the Secretary of State of the whole United States.

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"What do you think you're doing?!" Windhorn blasted.

I gestured at Devil. "Our guest brought me this hack saw and, uh, expressed curiosity. I am demonstrating its proper use."

"Stop that!"

"You advise me to be rude to our honored guest? I'd better have such an order in writing, Mister Secretary."

A career diplomat of thirty years' duration not to mention durability, Horace Windhorn has been recorded as having made two direct statements and never to have taken responsibility for any decision. One sentence of his confirmation hearings, 3.87 lines in print, contained seven qualifiers. I said what I said and watched his adam's apple bob as he looked at Devil. Windhorn licked his lips. Devil's small bright eyes seemed to bulge out of their sockets like a Chinese dog's. Her/his mouth opened to show sharp yellow teeth handsome as an old German shepherd's. Harsh guttural sounds grated out in a way few lions could have bettered.

"Devil," I translated, "says, 'You're out of round and roll badly!' "

And I thought: *Now you know, long lean and limpid!*

Devil's wings opened, expanded, and commenced a slow flapping. A nightmare in jet and crimson, it flew at Windhorn with deliberate speed.

As the Secretary of State departed with considerable alacrity, he shouted back, "All right! We'll replace the chains later!"

Of course it's a fluke that *Kennedy* possesses one set of chains (not intended for personal restraint). There can be no replacement. As soon as I was free, Devil insisted that I follow him/her to the galley, where I had supper. Devil personally eats an absolute minimum, but failure to feed a prisoner angers him/her to the point of violence. Obviously an important clue, but what does it mean?

It turns out that I can forget about chains and the like, because I didn't exceed my orders after all. An agent never exceeds his orders when what he does works, and my bugs are working. Too bad for Tatiana, who disavowed the whole escapade! All credit goes to American guts and ingenuity.

We have been receiving a steady stream of photos from all twelve cars of the Star Train.

On two occasions, when Devil left *Kennedy*, he/she went not to the lead car but to the last one. We received photos of that second visit. Devil enters from stage right. An alcove fills the center of our viewing area, and Devil draws a curtain in front of it. He/she then sits before it, and remains motionless. Time passes. The curtain is disturbed. Someone, something, converses with Devil from the other side of the curtain. Devil leaves without ever having seen the other's face.

The remainder of our Car Twelve film shows the empty alcove. And the eleventh car still appears to be empty.

The tenth car is filled with shining emerald water. The interior lighting varies on a 31-hour, 12-minute cycle, from an intense blue white to dull red to full dark. During the red (and perhaps the dark) part of the cycle, swift and supple creatures can be seen moving in the water. That's it.

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The ninth cylinder is filled with crystal and is a fantasy of continually changing multicolored lights. What are they? Jewels? Living beings? Computer memory elements; books?

The eighth car's interior is a garden. Warm yellow sunshine(!?) and darkness on a fifteen-hour cycle. Neat rows of plants with seagreen leaves and bright red pods in soil black as anthracite.

The seventh and sixth cars also appear to be empty.

Car Five holds mist. Yellow-green mist in which we see blurred shapes moving.

As 'Tiana and I had discovered when we crawled along it, the exterior of the fourth cylinder differs from the rest of the train. It's a trick surface coating so that the sunward side is richly reflective while the side in darkness is highly radiative. That surely means that the interior is cold, which surely means that the liquid we see is not water but probably oxygen and nitrogen. There's little of it; most of the space visible to us is filled with racks holding immobile creatures. From our viewpoint we can see only that these (frozen?) beings are furry and have humanoid feet.

Passengers in suspended animation? Or corpses *en route* to some strange funeral, perhaps. Or maybe they're TV dinners.

The bug on the third car showed nothing new, but I realized something. Some of the beings in Car Three wear armor and some carry swords. What I hadn't previously noted, being busy, was that the more vulnerable wear the armor while the weaker carry swords. None has both. Car Three's inhabitants live in a careful, planned balance of power.

The second cylinder's interior remains dark. Since the empty cars are well lighted, perhaps the second car houses those who prefer to live in darkness. Yuri mentioned an old story called "Nightfall." Said it was written by a Russian.

Most of the film from the lead car shows merely an empty chamber, or Angel moving about in it. In one sequence he/she sat for hours playing a game, a kind of 3D solitaire chess. In another he/she reached into the cage and grasped one of the animals. He/she slid that hand under its robe. The snowy fabric showed a brief flurry of motion. Then all was still. Angel sat and did absolutely nothing save stare, for more than an hour. He/she then rose and discarded the withered remains of the puffball animal!

Our angelic-appearing Visitor has unpleasant eating habits, and would most certainly not have displayed them, had she/he known we were watching. Once we learn this creature's name, no one will call it Angel anymore!

He/she therefore must not know about the bugs, doesn't know that Tatiana and I crawled around on the outside of the Train. Since the beings in Car Three saw us, we assume that they do not communicate with Angel.

Interesting, and we discussed it.

Our (probable) conclusion: Angel and Devil are crew, and Car Three contains passengers. The Interstellar Railroad is like the Long Island one; no communication between passengers and crew. Extrapolation from that conclusion: We have a probable opportunity to trade behind Angel's back. Stiva Shchurin is enthusiastic. Windhorn agrees, pro-

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vided that Tatiana and John do the trading while I remain inside the *Kennedy*.

Devil and I didn't have our normal language session today. She/he started by giving his/her name (or rather title: Parent!) and occupation. Soon we were ambling about the *Kennedy* while Devil pointed to different objects and rated their utility to his/her/its occupation. Pencil and paper were of some slight use. A radio proved a bit of an improvement, so I took Devil to our communication center.

I showed her the setup we use for worldwide telecast. His excitement was immediate and intense. Also most disconcerting. In a moment that demonic appearance *split*. His/her wings came off and flew excitedly around—by themselves!

The wings are a separate creature. Its body is a small image of Devil. I remember my thought: Good gosh, Devil *is* a them!

Apparently the satanic(looking) creature's race has large intelligent females and small winged males.

Devil is a her!

Now that I think on it, something of the kind was to be expected. The wings of "Devil" are far too small to lift her weight against any sort of gravity. Given that Devil has an emphatically small mate, it's clear that what appears to be a second navel is her sex organ.

Devil's title isn't "Parent"—it's Mother! Since her mate *appears* to be mighty inferior, I reckon she's even Mother Superior.

Once she had her husband back where he belonged—on her back—Mother Devil applied herself to the useful useless game. She let me know she wants props for a telepresentation. That had to be explained to the others, and cleared. We did that.

Windhorn and Shchurin have agreed. Here comes communication!

12: The Devil Wears A Mitre

A thrice-distinguished emissary from the far stars could not address the people of Earth without a suitable setting. The choice of backdrops afforded by the *Kennedy* was understandably limited. After a search, though, we scrounged together a slide projector and a translucent screen. With a suitable slide, this combination could provide any background.

I found a blank slide and gave Devil a swift demonstration of the technique. She soon grasped what could be done. I went directly to that worse-than-enigmatic sphere. At first Devil was not wild about the idea, but I was persuasive. At last she chased the linguists away from the device with which they had accomplished precisely nothing. Unless, of course, you count telling it more about Earth than is known by any individual on the planet.

Devil addressed Sphere. Nearly all she said was beyond my limited understanding of her language. That didn't hold true for the alien device. Sphere clearly obeyed her vocal commands. Interesting. I gave that considerable thought and haven't let go of it yet.

As a finale, Devil dropped the blank slide into the slot in the bulge-bellied

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monster's top and promptly received it back. In one piece.

The slide she had created from the sphere's incredibly broad Earthside memories was a magnificent montage. A building dominated, with great open doors through which filed a mixed group of humans and aliens of assorted ilk. Nearby shimmered a broad river in which another mixed human-alien crowd was being baptised(!). Above and behind all, a great figure towered in majesty. It was a human female with her arms outstretched in universal welcome. A fine picture; fine symbolism. The figure seems to grow mystically out of the building itself and most likely means something on the order of Holy Mother Church.

There was a problem. Devil had plenty of information but lacked subtle nuances. She wanted that great figure to express open, eager invitation. From her viewpoint she chose well: it was a stark-naked centerfold from the June 1983 *Penthouse*. Open. Even eager. Inviting. Unmistakably, unequivocally, explicitly, unconditionally, and very nearly unconscionably female.

Sphere, I realized, was not a genius.

It is a storage device, a single-volume encyclopedia. And Devil is a cleric! A mystic, not a genius. And as I had already discovered in other contexts, hardly the hyper-sophisticate one would expect to come bustling into our system on a trans-galactic railway system! Now Devil quite innocently, with endearing naivete, proved that there remained many aspects of human culture that she did not and does not understand.

I have to explain, I thought cheerlessly. *I* have *to!*

Meanwhile Mother Devil managed to arrange a planetwide telecast for day after tomorrow. That leaves me mighty little time to make a careful and diplomatic explanation of . . . things. Damn, oh damn!

Oh—also meanwhile, Wareagle and Vinogradova formed another temporary international alliance. Their trip to the Star Train was no less clandestine than hers and mine had been. They began by removing our laboriously placed monitoring devices. All had served their purpose. There's little more information they might yield now, and an old bug can be a traitor.

Unfortunately, John's and 'Tiana's oxygen ran a mite short and they had to scuttle back to the *Kennedy* before they were quite ready. They ran out of time before they could retrieve the bug on the Train's twelfth car.

They had succeeded in entering the third car without incident . . . and couldn't make a single deal! The passengers were unable or unwilling to offer anything except jewels, nor were they much interested in any of our goods this time. The "negotiations" degenerated into everyone's shouting "Russian" at each other in various accents. Ali Baba's cave had become the Tower of Babblers.

Wareagle has given me unpleasant, suspicious looks, and Tatiana and I are un-friends for life. Come to think, no joke: I am very probably #1 on the KGB hit-list, back on Earth.

As to Car Three, though . . . I think I know what's wrong. No use talking to that damned Windhorn about it. I've got to warn and explain to Devil and change her mind, and I've got to snatch

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some secret time to confer with Stiva Shchurin. I believe the Thinktankers are right. That would indicate that the beings in Car Three are representatives of Mature Civilizations. Civilizations so very, very old that they have advanced to their natural limits.

Of course that still doesn't tell us how high those limits are. My mother's cat, Lilith, is the descendant of a most ancient species; isn't it at the peak and end of its development?

To test my theory, though, I'm going to need help. If I'm right . . . Well, never mind that. I'm short on authority to order up the few little things we'll need from Earth. . . .

I have gotten Shchurin off alone. He agreed to have a try at the, uh, Q.T.G.C.D: the Quinan Theory of Galactic Cultural Development.

That was last night, or rather "last night." (Once Windhorn, most pensive indeed, actually said, "I wonder what time it is back on Earth?" After a few moments of silence, it was Judith who said the cruel word: "Where?" Less cruelly did the first Judith carve off Holofernes's head.)

Now John and Tatiana are back, again. The Q.T. of G.C.D. is on the mark! The DIA/KGB team returned bearing as great a mass of jewels and gemstones as they could manage. All this the third car's occupants pressed on them in exchange for the few little trinkets I had ordered from Earth: detailed drawings and specs, with scale models, of Watt's original steam engine; the McCormick reaper; the Whitney cotton gin.

Every sparkler 'Tiana and I brought back has tested out to be of the finest quality. I have no doubt that these will, too. The U.S. and the U.S.S.R.—well, all Earth, but a few of the very best gems may stick to this or that Russian or American governmental hand—are rich in the most ancient coin: gemstones. One assumes that oil-rich sheikhs and ministers and hustlers and attorneys will gladly trade many many *many* dollars and rubles for extraterrestrial rocks of enormous and permanent value. I hope and assume that we've broken no rules trading with those poor, uh, beings on Car Three. I mean, maybe they are . . . "protected," or some such?

Here's what I saw over there: Many beings of many cultures crowded into one of a dozen cars of a great Train all of whose cars were *not* full. Those crowded beings were forced to live in uneasy peace with one another. Medievally armored! Carrying primitive weapons! It finally hit me that they're either primitives or from cultures already at the peak of their development. Or both. I mean we imagine "peak development" as something out of H.G. Wells's or Olaf Stapledon's science fiction, while actually the best example of a creature at its peak, fullfilling its potential, is the cockroach.

Even on Earth dead-end streets are not limited to cities.

Car Three is steerage class. And those creatures have done very, very well indeed for themselves. So have we with them, while greatly aiding ourselves. Doing well by doing good, Tom Lehrer called it.

Now I've been elevated in status. Windhorn, Shchurin, and Quinan have had a high-level privy conference. (Un-

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happily we could not hold this conference in the proper place for such things, the *Honest John* having no Johns. All of which gave me another idea. Meanwhile . . .)

The deal done in Car Three, and its implications, places trading with the Railroaders in a whole new light—one warm enough to dry the mouth. If we cannot drive a favorable bargain, we three great leaders now realize, we will certainly wind up twelfth-class citizens of the universe, just like the beings in Car Three.

We! Imperial Earthsiders! That is unspeakable, unacceptable, inconceivable. To drive that good bargain, we must show the Railroad that we have something really needed by the "people" behind it.

Ah, vindication; the exultation in exaltation: Windhorn turned to me.

"Mr. Quinan . . . Irv . . . do you perhaps . . . have another idea?"

"Yeah, H.R.," I said, "I believe I have at that."

More than one problem continues to exist, looming a lot darker than the Transylvanian Court over Hammer Studios. Devil still speaks no human language, and my command of hers is pathetic. Nevertheless, she has confidently arranged to speak tomorrow. She intends to preach to all Earth. (It's a condition of trade. We agreed most readily indeed. What's one more religion on a planet that's birthed so many and on which one is probably being born right now?)

But—that picture she chose, with the same perfect logic and perfect stupidity as that evidenced by the missionary's wife Sir R.F. Burton wrote about. She stood in a broad marketplace and again and again showed off her knowledge to a local Islamic audience by crying "Allah bless you!" The trouble is, only a slight hawking of the throat differentiates the Arabic word "bugger" from "bless," and that 19th-century zealot kept yelling out the wrong word. (It would have been a marvelous movie scene. With Deborah Kerr, perhaps.)

Yes, I know, marvelously funny — except that such things have sometimes started wars.

Serendipity—the One True God, surely—had given me another idea. I employed it. With great difficulty and at some personal sacrifice, I persuaded Devil to substitute a tastefully robed, serenely sweet-faced Madonna by one of the old masters for the nude centerfold. True, Kathy Myers may never forgive me for the way I used her in a necessary demonstration of cultural taboos to our extraterrestrial missionary. Reason convinced me that there was no point in my trying to explain our nudity taboo to a religiosa who wears no clothing whatsoever. After I had patiently shown her the Madonna and explained that it would be a better tool for her job at hand, I demonstrated: I engineered Devil's walking in while Kathy was using the zero-gravity shower.

It was a messy scene, what with Kathy yelling rape, then nearly drowning when the shower control malfunctioned and a two-liter glob of water wrapped itself around her head like a monster on the Late Show.

Now, it's almost funny; *then* we were uncomfortably close to proving Station

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Keeper Harman right about grounders killing themselves in space.

However, Devil sees that our taboo is painfully real, and has discarded that bad tool, the centerfold. She is even willing to wear clothing. With help from an unexpectedly domestically-inclined Asad Bashir (whom I forbore calling the Valiant Little Tailor), I have created a bishop's mitre and robes for Reverend Mother Devil. Our supply of cloth was limited, and we felt that a patchwork garment wouldn't be suitable. So long as she doesn't turn her back to the TV cameras, though, she will be all right, and most impressive. The bat-like ears look very nice, rising up along the upsweep of the tall dunce-cap—that is, mitre.

I, conversely, will have to avoid facing the camera, so as not to show the shiner John Wareagle gave me while he was defending Kathy's honor. Damn him!—she had her hands over it, anyhow.

I regret to report that these were and are small problems.

The large problem is Angel.

As Devil is no Devil, Angel is no Angel. Since the former is the missionary from the stars to our poor benighted galactic fringe-area, the latter has to be the true genius: the trader.

"Let's, uh, try to nail this down," Horace Windhorn said. "First, you felt that the beings on that third cylinder were primitives who'd be more than delighted to trade for, ahh, technologia from the very dawn of the industrial age. And you were right. Preliminary estimates indicate the value of the gems traded for on that single Railway car comes to somewhere between ten to the ninth and ten to the tenth in our dollars. Now—"

"What," Asad Mister Calm Bashir asked, "does that mean?"

"Ali Baba's cave," I said.

"No," John Wareagle said tiredly, "it's really 24 dollars in trinkets and colored beads."

Ignoring him, Windy asked, "Now you are certain that the Train carried one missionary for the—"

"Holy Father Church," I said nodding. "The Church of All Intelligence."

"Contradiction in terms," Stepan Shchurin said quietly.

"No," I replied, watching him as he floated slowly across the Hidee Hole. We were gathered in the one place on *Kennedy* with some semblance of privacy, a hiding place where conspirators could whisper to each other. "No, not in the way the Church means the word we translate as 'Intelligence,' Stiva. It could also be called the 'Church of All Reasoning Beings'."

Asad chuckled, and I had to grin; OK, so that was still a contradiction in terms. Well it was necessary to some, and I wasn't about to knock it. I am about to be Earth's first bishop, which I think is a decent translation of "Bearer of The Universal Flame of *Her*."

Windhorn waved a hand, which is something we've all learned to do pretty well by now, up here. "Back to the point. The Train carries one missionary, those primitives who are . . . merchants, from . . . "

"Here and there," I supplied.

"Yes. And, presumably, trade goods, though we don't know what it is or

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where it's concealed aboard the Train. And finally . . . a single trader."

"Yes," I said, nodding again. "Angel is not only no Angel; he, she, or it is more than Conductor of the Intergalactic Railroad. He or what is *the* trader; capitalize it. I call Angel . . . Van Rijn."

"Van Reen? Why?"

Bother explaining! "Because that's what I choose to call Angel."

"And now you say that this—Angel's tactics are quite clear."

"Trading tactics, yes. Now that it's too late, I understand. Look, and consider. First we all thought the Rails were going to zap Earth. About the time we reached for the button marked Panic, they were twitched aside. Next, the Train headed directly toward us. About the time—uh," I corrected, remembering that Windhorn *had* hit that button, "it looked like curtains for us and the *Kennedy,* a minute and last-nanosecond adjustment twitched the Train aside so that it missed us. Angel likes to play chicken."

Windhorn nodded. "Hraboski."

"What?"

"Sorry," the Secretary of State said: that's twice I've heard that word from him! "Something I've read . . . probably the same as your Van Reen. A baseball pitcher."

I shrugged. "Van Rijn's a trader. Hasn't been born yet, save on paper . . . and maybe in Angel, in a way. Anyhow, the game of chicken, sweat the other party, continues. The sphere is a sort of computer, a sort of encyclopedic storage unit—which a computer is anyhow—and a robot translator. It was programmed so that it won't be able to translate until two days before the Train must leave."

"You are sure of this, Irving?"

"Asad: I'm sure. Not only did Devil—I mean Reverend Mother Sherthea—show me so, it is obvious. She is going to address Earth. She doesn't speak the language that well—any language of ours. She needs the sphere. Ergo, the sphere is going to provide translation as she speaks."

"Hey-y . . . wait a minute!" Stiva said, beautifully, considering it was in his third language. "You've been learning Devil's language . . . "

"I'm at the 'See Dick/See Jane/See Spot/See Jane Spot/See Spot Dick Jane' stage," I told him, "and that's all. I am able to phrase a question. I did."

Eyes lit up. "To the sphere?" That was Windhorn, excited.

"Yeah. Don't bother to ask. Nothing. Nada. It ignored me. It responds only to her, Devil: Reverend Mother. And presumably to Angel. It ignores us. I've told you—the thing's programmed to ignore us, just to take what we give it *and keep it,* until our sweet Angel is damned good and ready to say 'Trading time is open, folks. What've you got *left?*"

"Jesus," Windhorn said, with fervor. "Nothing. We've fed damned near everything there is into that bloody sphere."

Shchurin stared at nothing and thought aloud. "We could try to wrestle the sphere through the airlock and into space. We could push it and that, uh, tin can well away from this station." (Windhorn snorted at the "tin can" phrase.) "You do understand that I did not know what was in the package that

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Tatiana Vinogradova brought onto our station, and over to yours."

"Of course," I said, exchanging a look with Horace Windhorn.

Of course. The Deputy Premiere of the Soviet Union did not know that the combination *Pravda*-KGB agent had brought a bomb onto his shuttle and thence onto the Soviet space station and thence onto the hull of ours. Sure. It was not a time, though, to discuss such matters. We were all in trouble, together.

"You're talking about blowing up the sphere to keep the Railroaders from gaining all the information, free," I said.

Shchurin nodded. "Yes. The yield of the weapon is adjustable and can be set low enough not to harm us down here. Obviously, destroying the sphere is something we would do as a last resort only. Presumably without it, we could not communicate with Angel at all."

"Presumably," Asad said quietly, looking uncomfortable without a tube of tea, "Angel would also be sufficiently perturbed to make departure with considerable alacrity. Not to mention bad feelings."

"In addition to being pissed off and taking off posthaste for home," I said with a grim smile, "he might also decide to *return*. That is, the people—the beings—behind Angel might decide to return . . . or send us a little *present*."

"Such as—" Windhorn suggested.

"Such as *not* twitching the laserails aside from the planet, next time." Shchurin said. "Scratch that idea utterly."

"Wait!" Wareagle protested. "My ancestors blew it by not killing the first white men on the beach. If you don't have the guts to bomb that globe-blob, why not use a Cow Magnet?"

While we stared at him, wondering if the Noble Savage had slipped a cog in the head, John smiled his Crafty Apache smile and said, "I see none of you grew up on a farm. Cows eat all sorts of things—nails, fence staples, stray bits of barbed wire and suchlike. To keep the dumb beasties healthy the farmer feeds them Cow Magnets. Strong little magnets coated in Teflon so they're nice and slippery. In one end and out the other, taking all the iron nasties with it."

I tried to ignore a mental picture of a Discontented Cow passing a long strand of barbed wire, while Windhorn snapped, "That's disgusting! And it has nothing to do with our problem with that alien sphere-thing!"

"Perhaps not," Stepan Shchurin said slowly, thoughtfully. "If Sphere's memory system is based on anything like magnetic tape, feeding it one small powerful magnet . . . " He paused meaningfully. When he continued there was a very Russian quality in his soft voice. "While destroying all of a being's memories is close to murder, it can be considered expedient . . . and it's sufficiently subtle that . . . "

"Stiva," I interrupted, "didn't your mother ever tell you the story of the mice who planned to put a warning bell on a cat?"

His gaze followed my pointing finger. He saw what I'd seen a moment earlier. Sphere was quietly sitting (?) just outside the Hidee Hole.

Nothing ruins a quiet evening of plotting murder as badly as the discovery

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that your intended victim is eavesdropping. Of course, we had seen no evidence that Sphere was programmed for self-preservation. Neither was there any indication that Sphere could ingest and analyze anything as big as a human. Still, after what it did to Judith's frog . . .

Shchurin said, "This is merely another pressure tactic. We know this and we don't know what to do about it: our eventual negotiations will be under extreme pressure, and most of what Humankind has to trade has already been given away."

Sure, that's what we were talking about. "John," I muttered, "was on the right track. We can't destroy or even disable, uh, it because we'll need its help to trade with Angel. What we need is something that'll work like a Cow Magnet; a selective laxative. Or a diuretic. Or a . . . whatever you call it—a vomit inducer."

"Emetic," Asad said, proud to be able to contribute something.

The other two, First Contact Team's Noble Leaders, were both looking expectantly at me, who had made intelligent noises. Maybe even sensible ones.

"You have an idea?" Shchurin asked hopefully.

"Irving?" Windhorn said hopefully.

"Not a seed," I said dolorously.

The others don't know I recorded that session. With this and that strike against me and probably the whole damned Soviet government wanting my hide, I think a bit of Brilliant-Irving on tape could be valuable. If something works out, if I can get my head together and come up with a brilliant Plan To Save Human Destiny, I can always substitute a drawn-out "Ab-so'lutelyyyy" for "not a seed," which runs a lot less than 17.5 seconds on tape.

That major problem continues, and may overshadow the other one to the point of making it unimportant. Nevertheless, it's bothering hell out of me. The other problem: With both Devil and Angel now back aboard their Train, I don't dare go out to remove the bug from Car Twelve. I haven't a seed of an idea . . . but as if that weren't enough to worry about, that minicamera remains. A seed of disaster still in the ground.

Angel and Devil have re-boarded the Honest John. They went directly to the sphere. On command, it burped forth two nice little disks. Each of the aliens placed one on its throat. They adhered! Brushing past me, Angel went off with Windhorn and Shchurin. Devil, or rather her disk, spoke to me in perfect English.

"My son, come. The hour is come when we shall spread the Word to your waiting peoples."

I managed to snatch a few seconds to ask Tatiana to retrieve that twelfth minicamera from the Train. She was more than reluctant. She was downright unfriendly. I explained the danger and asked how she'd like living on a Jewish world in a Spanish Inquisition universe. She understood the analogy, and went for a suit.

I joined Reverend Mother . . . Devil.

The disk gave her a crisp matronly voice in absurd contrast to her appearance: a demonic horror in ecclesiastical garb. I crossed several fingers while she

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took her place before the Madonna-dominated pastoral-church background.

Lights. Cue the camera. Cue the monster. Uh, make that *missionary*.

13: A Hard Bargain

"Beloved Children under God," the Reverend Mother began most impressively, "I come not to reveal *New* Truth to you, but to *remind* you. To Call You Back to the Truth you have Always Known, and to tell you of the Vast Community of intelligent beings under God; the Great Mass of your fellows Throughout The Galaxy who share this Truth with you."

Her pause was just as impressive. Computers and humans all over Earth, meanwhile, were providing translations into who-knew-how-many tongues for all those people so benightedly misfortunate as not to have English as a second language. That includes my countrymen.

"Naturally the Revelation of the Ground Of Being to each intelligent race is in terms of that race's Viewpoint. Thus One Reason for Our Coming is our own humble desire to learn how God, Our Mother, has made Herself known to you."

I wondered if Mother Devil's religion would take. Being a perfectly sincere person myself, I can't stomach the hypocrisy that organization always involves one way or another. Still, Devil was consistent. Given the status of men in Her society, God had to be a Woman! But—which came first, the chicken or the egg? Probably Mother Devil had already converted millions of feminists at the mere twitch of a knee. Ah humankind, thou art marvelous.

It was obvious that she was a kind being in word and deed. I had better evidence than anyone. Yet I could easily imagine her becoming what she appeared: a Holy Terror, an Inquisitor. I'd seen her angry, as Windhorn had.

If only Tatiana can get that damned bug . . .

"The form in which a race receives its Revelation," the Reverend Mother was saying, "depends on the symbols appropriate to that race. Thus, for example: for all oxygen-breathing creatures water is a symbol of cleansing. Hence their True Revelation teaches Baptism by Total Immersion for the repentance of sins, bad manners, genetic defects, or whatever problems or prohibitions that society holds. While the liquid used for baptism is most commonly water, the True Faith understandingly stipulates that baptism be effected in whatever liquid is required by a purpose of Sincere Repentance.

"You must realize that countless different intelligent races people the galaxy. Some are more advanced than you of Earth, while others are less. You must not feel inferior to the one or Superior to the other, for all have fallen short of the glory of the Creator. All in their own ways are subject to severe limitations."

As broadcast, Devil's preaching was somewhat halting. There was no synchronicity between sound and her lips, and the total wordage she spoke was considerably greater than that which emerged from the translation disk at her throat. Now and again, a phrase or sen-

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tence had no appropriate equivalent in English, and the disk was silent. Devil must try again.

Where was 'Tiana? If she didn't get that bug before Devil's sermon ended, I couldn't act.

The sermon droned on. Perhaps the Reverend Mother—*Il Mama!*—would be willing to answer questions afterward. That would allow me to do a bit of stalling. What could I ask that would appear to be honest, thoughtful questions without betraying the fact that I had no use for organized religion?

I worried, squirming in my seat like a small boy in church. At last Kathy was behind me, whispering.

"John said to tell you that Tatiana is on her way back. Mission accomplished."

I began breathing. Devil reached her conclusion. As planned, I stepped forward and knelt before her.

"Reverend Mother, our religious leaders will wish to talk with you. May they come and receive your blessing?"

"I shall be blessed by their coming, my son."

My next words were according to my own fingers-crossed plan and a surprise to Devil. "Reverend Mother—we practice the confession of sins. Is this practice universal and accepted by Holy Father Church?"

"Many follow the practice of confession, and the Church recognizes that it is valid for their needs."

So do psychologists, I thought, and was pleased; I had assumed that I already knew the answer. Surely we had seen our "Devil" hearing a confession, one day in the Star Train's last car! Now came the real fingers-crossed-tightly part. I was about to become a great planetary hero, or . . . no one would even know that I'd tried.

"Might I then, on behalf of all humankind, confess our sinful history?"

Devil's ears decidedly twitched, and I knew fear that she wasn't going to go along. Surely she couldn't suspect! Then she said,

"As representative of your people, one planetary group of the great body of the Mother's farflung children, you may speak for yourself. I now name you first Bishop of Holy Father Church of Planet Earth, and empower you to confess on their behalf—subject to my meetings with your planet's already consecrated leaders through their own customs."

What I heard in all that was an agreement. "Yes" would have sufficed. The sphere heard all she said, via the translation disk attuned with it. It had heard me named her aide. Bishop Irving! I shouted in her language. Though Sphere was on the other side of *Kennedy,* the sound carried and it sped to us; to me. A seemingly crystal sphere, unadorned, miraculously afloat—and stuffed invisibly full of all the knowledge of Earth.

"Reverend Mother," I said from my knees, "our shortcomings, and offenses . . . the many times we were faint of heart in the Good Cause and determined in the Bad . . . all our failures are so great that Time Should Fail in the recounting of them. In our shame, we have recorded all . . . here." I gave the sphere little more than a touch; it floated to her without bobbing.

She laid her hands on that smooth surface. "Your repentance is accepted. Know that your sins are no longer re-

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membered by God or Her priest." Staring at nothing, Devil spoke in her own tongue. She uttered several words I couldn't recognize, and which the disk did not translate.

Then one word emerged from it: "*Erase.*"

The sphere became a swirling chaotic riot of images that seemed to spread and grow and swirl without coalescing until we were surrounded by a mad whirl of sights and sounds; the bodies of centerfold people and movie shootouts and Gregory Peck and MacArthur and Raymond Massey as Lincoln and Roo-sevelt as bear and Ro-sevelt as God; NFL playoffs chased Dallas cheerleaders and that fantastic '89 Series and Khrushchev drumming with his shoe and Jack Ruby firing and Gandhi shaking his head and Martin L. King yelling and the crowning of him who had been Bonnie Prince Charlie and the process for polishing diamonds and the great Bessemer furnaces and the new models from Detroit and from *Vogue* and the gore of telenews and the making of chainmail and of Concorde and of love and of war and of Chop Suey and Chicken Kiev and Eggs MacDonald and of the president and of Space Station *Kennedy* and swirls and swirls of jumbled mathematical figures and signs tumbled past and then

The sphere was still, empty. And the misnamed Devil knelt in prayer. And the telecast was over. My first act as first bishop of Earth had been to con my investor.

Devil did not rise. Her breathing was shallow. Nor did she respond when I spoke to her. Apparently she had been so moved by events that she had slid into religious trance.

With a small smile in the direction of Sphere, I left her.

Secretary Windhorn and Minister Shchurin were conferring with the misnamed Angel. Negotiating. Most members of the Contact team waited outside the Hidee Hole, listening via bugs and looking like the inhabitants of Mudville after Casey struck out. Colonel John Wareagle of the Defense Intelligence Agency filled me in.

"Windy and Stiva tried to bargain for technology but got a flat refusal. Angel claims that the Railroad pays in only one coin: transportation. If we don't like that, it's okay by him. Says the only reason he stopped the Train in our solar system is that killing a little time here allows him to use an overall faster route. You know—some other Train has to get off the track if he's to use the most direct route."

"Swell. Nothing like being important."

"Umm. He offers to take a trader from Earth on a round trip of twenty-three planets inhabited by intelligent beings. In return . . . " Wareagle firmed his lips and gave his head a jerk. "Irving, he wants coolie labor. One thousand seven hundred twenty-eight people to work in various job capacities too dull for *'more advanced beings.'* "

"Damn. Angel speak with forked tongue."

"Not funny, white-eyes. It's an indenture he's talking about, for ten-point-four years—"

"That's not so horrid! Ten years—for the most fascinating experience of all humans of all time *and* instant wealth for book contracts and tele-appearances ten minutes after return."

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"—travelers' time," Wareagle went on, ignoring me or perhaps not hearing. "They won't return for a thousand years, Earth-time."

"Oh."

"Two hundred eighty-eight of these people are to leave on this Train, and the rest on another Train that's en route already. Windhorn fumed and Shchurin fumed . . . but it's Hobson's Choice. Unless they agree immediately there won't be time to load the workers."

Load. Lovely word, for humans. Twelve cars on the Galactic Train, and the empty ones reserved for us. Triff.

I returned to Devil. She remained in religious trance. Carefully, I experimented with her translating disk. She didn't notice. Rev. Mother Devil noticed nothing. She looked as if she might erupt stigmata at any second. I discovered something not previously visible—a small plug in her ear. Placing my own ear close to that tufted receiver, I could hear how it translated what I said.

"As Bishop, need I report to the Whatchamajig?"

The translator spoke into her ear in her language, and I heard, "As Bearer of the Universal Flame of Her, am I to report to the Keepers of the Holy Flame?"

I smiled. What I'd expected was true. Given enough information in a sentence, the disk would translate "Whatchamajig" and "whatchamecallit" as the correct word or phrase. It could add information to a sentence, provided the information was clearly implied.

When I returned to the others, Windy and Stiva had just capitulated and the agreement had been entered into the sphere as a binding contract.

"Gentlebeings," I said, "I trust that I do not intrude."

"*Nyet.* We are finished," a dolorous Stepan Shchurin said. "Especially, *I* am finished."

The wide expressionless blue eyes of Angel/Van Rijn fixed on me. "Well, little priest-pet-and-lover, what would you like?"

"If you have finished the secular business, there is a religious matter."

"Ye-ess?" That beautiful being of golden feline grace gazed impassively.

"Yes. As the newly ordained Bishop of Earth, I am concerned about a possible heresy and smashing of the Prime Injunction. As you know, between the fourth and fifth planet of this solar system lies a zone of broken rocks, the shattered remains of what was once a planet."

"What of it?"

"It concerns me that you, as representative of the Railroad, are not showing a proper purpose of repentance for the destruction of that planet-that-was."

"But the Railroad had nothing to do with that! Couldn't have! Our precautions against such accidents are totally effective."

"Only God," I said with all proper sententiousness, "is totally effective. I'm sure you can make all these arguments before the What-ever-it's-called Inquisition, Trader. Of course, such a trial would not be held in a closet, and the Whatever-Safety-Committee-You-Fear-Most would learn that your Whatchamacallit Division goes around smashing planets into asteroids."

Poor Angel. I was speaking nonsense into his translation disk and what it sent to his ear made it appear that I knew

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what I was talking about. I had become a worthy bishop! His face held no expression, showed nothing and probably never could. His hands, however! All four thumbs and eight fingers were crawling like a can of worms.

Fond of playing chicken, was he? How I'd love to get this guy into a high-stakes poker game! With him, I'd even accept Glicksohn rules.

"What you threaten," our golden angel said, "could at most be a slight annoyance, but . . . very well. You may have a second tour covering another thirty-six planets. Of course, this is entirely a charitable gift and the Railroad admits no responsibility."

"Ummm, I understand; I am a true son of Holy Father Church and do not concern myself with the secular details of the settlement," I said bishoply. "I expect, though, that these worthy beings will insist on a full Class-A Number-One Grand Tour."

The disk, of course, reported that to Angel's ear in whatever words meant "The Best." Angel's four opposable thumbs opposed each other isometrically. "Impossible! I cannot go beyond Class Three." His hands were rigid.

I shrugged. "Very well, and the Church takes note that the Railroad's Trading Representative is charitable, within limits. We come to the secondary problem. The ninth planet of this solar system is not properly a planet at all, but a moon that someone's unconscionable carelessness has knocked out of its normal orbit about the eighth planet."

Angel Van Rijn's hands remained rigid. "For that, another Class Twelve Tour." While I hesitated, he added, "If you don't like that, we'll put the damed planet back where it belongs."

"I heard you say 'belongs,' not 'where it came from,' " I said, knocking him off-balance with words. Then I agreed. I admit that I didn't have the *chutzpah* to try to make him pay off on the rings of Saturn.

The agreements were formalized, and Angel sat back, hands relaxed. *Oh hell,* I thought, *he's back on balance!*

He was, or thought so: "Of course, to go with these tours you are going to need some trade goods."

"Of course, of course. But first, a minor matter. I am puzzled that the range of jobs you offer is so limited. My people have many excellent qualities. For example, courage. Have you no challenging jobs, no dangerous ones?"

"A few," Angel allowed. "In fact there is one task of singular urgency for which suitable beings are needed. There was hope that we might find candidates in this . . . younger area. Unfortunately these tasks require qualities that your race entirely lacks."

"Pray explain."

"The need is for beings with—I doubt whether your languages have the words. For example, beings with the qualities we seek would have attempted a surreptitious investigation of the Train."

"But—"

I waved a bishoply majestic hand to shut Windhorn up. He didn't close his mouth; he hadn't for some time. He did cease speaking.

"Oh," I said, "you mean chicanery and deviousness. Your requirements seem a contradiction, since those who

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are most skillful would be those who would escape your notice."

"My god," Tatiana most un-Communistly said, "I should've left that damn bug!"

"I expect such sophistry from you," Angel told me, ignoring Tatiana, whose words probably hadn't even been translated to him. "It may amaze you, Priestling, but every car of the Train is studded with Eyes that see in all directions and never sleep."

"Gosh."

"It is quite impossible," Angel went on, sententious as a bishop, "for any creature to approach the Train without my knowledge."

"It is a shame your race is incapable of a supercilious smile, Trader." I gave him a sweet smile. "Well. I see. Too bad for us. May I ask a small favor? The Reverend Mother is in prayer and I would not disturb her. Moreover, the next days will be exceedingly busy." Reaching into my pocket, I drew out a piece of bluegreen crystalline fire. "Please give this to the Reverend Mother at some convenient time. It is a small token of our regard for her. Perhaps common to you, but very rare to us."

Angel's super-supple hand grabbed the jewel from Car Three while his gaze never left my face. "About the trade goods you will need during these tours," said this creature unworthy of the name Van Rijn. "Nearly everything your culture has to offer has been fed into the sphere. It is Railroad policy that whatever an employee learns in the normal performing of his duties is his private property. Thus I could sell all this before *your* traders reach the markets. However . . . I am willing to sell these bits of Earthside information back to you."

"Thank you, Angel! You are all . . . spleen. The offer shows thoughtfulness and certainly thought. But it isn't necessary. If you will examine the sphere's data banks, you will see that we confessed our sins to it. Mother Sherthea granted us absolution. She has caused our . . . sins to be forgotten." My smile was extravagantly sweet.

Angel's eyes went white while he became absolutely rigid. Maybe he'd be fair at poker at that; he didn't try to turn over my cards by checking the sphere. Like a sleepwalker, the Galactic Trader left Space Station *Kennedy*.

After a tremendous party, I came down from an emotional high, way down. Oh, it was good to be a hero. The trouble was, I hadn't really won anything. Undoing Stiva's blunder and getting Earth out of the hole put us right back where we started. Square One.

What about the problems we've had from the start? Kathy Myers says that human civilization is at a crisis stage. Rising population and declining resources; problems that only a massive transfusion of galactic technology can solve.

On the other hand, old John Wareagle claims that an alien "helping hand" will do for us what the white man did for—or to—his ancestors. Who's right? There is great evidence for both viewpoints. And what, if anything, can I do about it?

14: Dune Confession

The Video Transceiver buzzed and

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an indifferently pretty redhead announced, "Please stand by for the President of the United States."

As Fairborne's image appeared in the upper right corner of the screen, Tatiana stage-whispered, "I see it's still true; the less important people come to the meeting first."

Before Windy could protest this insult to American National Honor, the VT buzzed again. A prettier brunette announced the Soviet Premier and he appeared in the lower right corner of the screen.

"I wanted to have this meeting," Leonid Zukov began, and stopped, apparently just noticing that the left half of the screen was still blank.

As he opened his mouth to comment, the VT buzzed a third time. An absolute knockout blonde declared, "Please stand by for Carlton Sinclair, Editor-in-Chief of *The New York Times*."

My boss was coming up in the world, way up. He had half the screen while the heads of the SuperPowers had only a quarter each. Or rather he would have half when he appeared . . . if he appeared . . .

For at least a minute, maybe two, Carlton kept Everybody waiting. When he finally did appear, he was on another phone in a conversation he had the gall to finish before turning to us. Then he said smoothly, "Sorry I had to keep all of you waiting, but I'm dreadfully rushed these days."

"What are you doing here?" Premier Zukov demanded thunderously. "This is a meeting of Heads of State and nobody—"

"No," Sinclair interrupted blandly, "this is a meeting of the First Contact Team with their immediate superiors. Your people, Lenny, and yours, Joe, made a terrible mess of things. They nearly *gave* away all Earth's real wealth, largely due to the dreadful supervision you two gave them. Fortunately, acting under my brilliant guidance, *New York Times* reporter Irving Quinan was able to transform the near disaster into a great victory."

Abruptly he smiled directly at me. "Irving! I'm very grateful for the way you followed my instructions and I want you to know that your good work will not go unrewarded. Ordinarily as a new employee you would not be eligible for a raise until you'd completed a full year's service; I, however, am going to see to it that you get a full 6% salary increase effective next month."

While I was busy being underwhelmed with gratitude, Premier Zukov exploded in Ukrainian profanity. Something to the effect that Carlton could outlie Satan or even Nixon. He had a point. The only leadership Carlton Sinclair had given me was to send my stories back with the errors in spelling and grammar marked.

Totally unfazed, Carlton replied, "Ahh, but that's precisely it! I did nothing, sent no instructions, because that was the kind of leadership the situation required. I picked a good man and told him that creativity and initiative were expected. After I sent him to the scene of the action, I left him alone. The two of you," he continued with heavy scorn, "were perpetually on the backs of your people, so grossly oversupervising them that—if it hadn't been for my good Irving here—a disaster would have been inevitable."

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"If you think anyone would believe such absurd . . . " The Soviet leader's voice trailed off.

Whatever his faults, "Lenny" wasn't stupid. It's a rule that Leaders get the credit—and blame—for what their subordinates do, and the story of how the representatives of the U.S. and U.S.S.R. screwed up and would have pauperized our planet if the Brave Young *N.Y. Times* Reporter hadn't saved the day was, of course, already composited, ready to print. Probably Carlton had that tape I'd made for proof. He didn't really need it. 'Twas a tale people would gladly accept without evidence.

In a very different tone, Premier Zukov continued, "But, obviously, there is no need to discuss these matters. The Soviet Union has the greatest respect for *The New York Times*. Just this morning your application for permission to publish a Russian-language edition in Moscow was approved."

"Throughout the Soviet Union," Carlton corrected.

"Yes. Yes," Premier Zukov concurred. "My memory isn't what it used to be."

Carlton calmly "reminded" him of various other things the *Times* wanted and the Premier paid each and every bit and byte of blackmail. Zen! If only we'd had Carlton in the First Con Team, Earth would probably own half the galaxy. I could only wonder what he had forced President Fairborne to pay. Aside from arranging this conference . . .

With the negotiations completed, Fairborne snatched the ball. "Premier Zukov, given that an extraordinarily historic event has been brought to a basically successful climax," he said presidentially, "might it not be in order for the two of us to proclaim a day of worldwide rejoicing?"

"Gentlemen," Kathy Myers interrupted, "I'd like to point out that there's small cause for celebration. Our world needs—"

"Miss Myers," Fairborne cut her off harshly, forgetting both "Ms." and "Doctor," "given your present status, I think you'd be well advised to file a written report through channels and—"

"SHUT UP, *gringo!* You can freeze me later if you want, but I'm going to have my say!" Her eyes flashed to rival Sirius. "Living conditions in Hell are much better than they are in Mehico and India and a lot of the rest of the world! If any of these poor people try to migrate, go to some part of the world where conditions are better—what else? You Russians shoot the Indians, Bang, Bang, that's it. You Americans are worse. Your ISP caught my whole family. My mother, my father, all my brothers and sisters—everybody except me—and gave them a choice. Back to Mehico, Wetback slime, which is back to Hell! Or we could 'volunteer' to be frozen in liquid nitrogen and kept in that huge vault you have in Carlsbad!"

"That," President Fariborne replied only a little shakily, "is basically a very negative way of viewing what is in fact a humane method of managing an extremely difficult problem. The Illegals in Carlsbad all decided, of their own free will, that in preference to returning to their Sovereign, Great Native Lands, they would migrate to the future. To a time when the world will be a better place. The suspended animation process

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itself basically has a surprisingly low fatality rate and—"

"COÑO!" Kathy exploded. "The fatality rate will be 100% because the world isn't going to be a better place in the future! Our civilization is sliding slowly down hill. When things get bad enough for you gringos, you'll decide that the Illegals aren't people, but TV dinners without potatoes!"

"Surely, Miss Myers, you don't seriously think that—"

"*Doctor* Myers, doubly, chauvinist hog! What do you think is happening in Mexico right now? Is too many people and not nearly enough food. That's a problem that has only one answer!"

After a long cold painfully uncomfortable silence, Carlton Sinclair picked up the trailing reins of "conversation."

"Doctor Myers, I am aware that you have just told the truth at significant risk to your personal well being. *The New York Times* not only respects such courage, we value it in our employees. May I offer you a Position With Our Organization? Perhaps something in our London branch. If you were to return to Earth with the Russian team, it would minimize your transportation expenses and perhaps avoid . . . certain other difficulties."

Kathy, or whatever her true name was, trembled ever so slightly. "Thank you," she said. "Of course I accept with gratitude. But what about the problems of our world?"

From her tone it was quite clear that Kathy was not about to be bribed, even with her own life.

"As for the larger problem," Carlton answered quietly, "I'm sure that both the president and the premier would be willing to consider any reasonable suggestion you might make."

In the same I-won't-be-reasoned-with tone she replied, "The Railroaders have the technology we need to solve our problems and we must have it!"

"How?" Carlton asked, with sweet reasonableness. "We have, unfortunately, managed to outsmart ourselves. The one thing we have to trade that Angel might really want is our antisocial skills and we employed them with such skill that the Trader doesn't even know he was robbed. In principle, we could risk angering the Reverend Sherthea by telling Angel what we have done. But what could we gain? Angel is bound by rules, and can give us nothing other than interstellar transportation. While in a few centuries such travel will no doubt prove incredibly valuable, it is of no use in terms of our short-range problems."

Kathy obviously had no ready answer. Neither she nor anyone else had the faintest notion, and I wasn't about to reveal my half-formed plan. If it worked; if I was able to catch Angel in a vise and squeeze him, well and good. Otherwise it would be best if no one knew I'd tried.

"Since, *Doc-tor* Myers," Fairborne grated, "you have the ability to complain eloquently about the need to solve problems, but can't suggest any solutions, it's just as well that you're leaving government service to work on a newspaper. Now if there is no further business—"

"I'd like to point out," John Wareagle drawled amiably, "that what is probably the most dangerous aspect of this situation is going to take place to-

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morrow." Immediately he had their full attention—ours!—but his next words blew it. "The Reverend Mother Sherthea will preach again tomorrow to all the world's religious leaders on closed-circuit TV. There is plenty of historic precedent to show that when an advanced civilization contacts a primitive culture, most of the damage is done by missionaries, not traders. Therefore, I suggest—"

"John," Fairborne laughed, "you sound like a broken record. In the first place, religion has basically zero influence nowadays, so it doesn't make any difference what the Reverend Whatshername is going to say. In the second place, she isn't going to say anything even mildly controversial. According to the Thinktankers . . . ahh . . . I'm not too clear on the details, but . . . "

"In Volume 7, Chapter 10," Carlton Sinclair smoothly supplied, "the Moeller-Rand analysis discusses the spread of Buddhism. In its heyday, Buddhism spread far more rapidly than either Islam or Christianity . . . *and* achieved the conversion of millions without the slightest occasion of violence. This remarkable achievement was due to the fact that Buddhism was an eclectic religion: whatever the local religions taught, the Buddhists accepted as part of the Great Truth. If a religion is to spread across the galaxy, it would necessarily have to have that kind of doctrine and approach."

"Which means," Fairborne added impatiently, "that basically there's nothing to worry about. The Reverend Whatever said that she wasn't here to preach any new religion and that's the truth! She's just here to sprinkle a little Holy Water on our religiosi, and tell them to keep up the good work. It will the be the first time in a long while that anyone took the poor dokes seriously."

Except for you at the last election, I couldn't help thinking.

"Sir," Wareagle replied respectfully, "if I may correct you, The Reverend Mother Sherthea plainly said that the human race has one and only one True Revelation. She will endorse only one of our world's many religions as the sole truth for men. And women," he hastily added.

There followed a moment of silence. What John had just said followed logically from the Thinktank report. If the Church of All Intelligence was a federation of the religions of mature civilizations, races of thinking beings so old that they had their heads straight, then in such a group there would be only one religion per race, one accepted-as-true revelation.

"That," Fairborne said slowly, "might cause a bit of commotion. Still . . . I don't believe we should worry until we have the facts. We can reasonably judge whether or not there's a potential problem from whatever slides, audiovisio aids, this preaching mother is planning to use. And Irving here, as her assistant, can quite reasonably ask for advance copies."

All this smacked a little too much of betraying a friend. I objected.

"Gentlemen, what you want may not be possible. Mother Sherthea is now on the Train and is not expected to return to the *Kennedy* until immediately prior to the meeting with the religious leaders. Since—"

Station Keeper Harman interrupted,

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"Message just received from the Star Train! The Reverend Mother Sherthea requests that Irving come to her at once."

9: A New Baptism: To Die and Be Born Again

As I sailed through the void toward the Star Train, I could see that the door of Car One was wide open to receive me. This time around my aim was all too good. Instead of landing on the Car and walking with proper dignity to the door, I dropped right into it for a hole-in-one. I started to rise and was immediately slammed flat on my back by the rapidly mounting gravity. There was nothing to do but wait while the gravity lock cycled.

Beyond the bars of the grav lock I could see the interior of the mysterious Car One . . . which was nothing like what we'd seen from outside. Instead, a vast high-vaulted dark room loomed before me. Its walls were covered with dimly visible complex carvings. With considerable gee force squeezing me down, I had to squirm to look in more than one direction.

Though it was impossible, this huge room was wider than the entire Star Train was long. As to its length . . . I couldn't see that far.

For countless kilometers, like a Corridor of the Gods, the room stretched until it at last vanished into shadowy darkness at the limits of my vision.

Fortunately for my sanity, I didn't think to look directly up until the gravity lock was finishing its cycle and I was free to rise. Above me, filling the entire ceiling, was a single great Eye.

I told myself that logically it had to be just a decoration. I began walking out into the room. I told myself that often and firmly, and all the while the sense of being watched grew stronger. When I spotted the exit, a tiny door perhaps a half a kilometer away, the temptation to run was irresistible. I didn't panic . . . quite.

I did feel compelled to run faster until, thoroughly winded, I rushed pell-mell through the door and . . .

. . . out onto a white sand desert. Wind-blown sand from one horizon to the other and directly above a sun—obviously not old Sol—burning down in blue-white brilliance. And the sand seemed purest crystal.

From behind me a voice said, "Irving, your pardon, please. I did not expect you so soon, else I would have met you at the gravity lock."

Spinning about, I saw Devil. "But that is all real!"

She shook her head. "It is a Simulation—but not an illusion. It is from the Simulatron. If you kick a rock here you are as apt to break your toe as you are anywhere else."

"Ahh, okay. But what's the purpose of all this?"

I felt sure that the reluctance was hers, not the translation disk's. Her voice came from it slow and uncertain.

"This is the . . . likeness of a place where as a youth I grew in wisdom, the Temple upon the dead world Rannarak. Whenever I face a difficult task or decision I come to this place to seek strength."

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"Why did you send for me?" I noticed that my voice was a little anxious.

"God Who is your Father and my Mother has laid a heavy burden upon us, and as Bishop of Earth it is your place to hear my confession."

The knife, it seemed, cut both ways. "Certainly," I said, considering. "However, I must tell you that there are those among my fellow Earthlings who are nervous about what you may say tomorrow."

"I cannot tell them for I do not yet know."

"May they have advance copies of whatever slides, visual aids, you may plan to use?"

She flapped her left hand, a gesture that I think means something is unimportant. "When you leave, you will find what you have requested inside your spacesuit."

Abruptly I realized that although I hadn't removed my spacesuit—as far as I could remember—I was walking around in ordinary clothing. Whatever the Simulatron was, it was evidently more potent than an LSD trip.

"Ahh, then . . . " There seemed no way out of this awkward situation except straight ahead. "How—pardon my ignorance, Reverend Mother—do I hear your confession? Is there some special form or procedure or . . . "

"It is enough that we are alone." She paused, and an expression I couldn't identify crossed her face. "One advantage of this Simulation is that it guarantees us that my traveling companion, he whom you name Angel, will not accidentally overhear what we say."

She started walking slowly across that impossible crystalline sand and I followed her in silence. As she reached the top of a dune, she said, "The Railroad visits millions of worlds that are suitable homes for life. Each in its way is radically different from all the others. Yet, every world still falls into one of three prototypical kinds. Typically, a world may provide the conditions necessary for life for ten billion years. Since life itself may appear quickly, while the evolution of intelligence may require half of those billions, it often happens that the Railroad finds planets teeming with life but no intelligence. That is one kind of world."

I nodded. *Cosmos* is rerun annually, and still we learn—without understanding.

"On the second kind of world the Railroad finds mature intelligent races. Beings who have attained whatever level of civilization God in Her Wisdom has chosen for them. *His* wisdom, from your viewpoint. Now, Irving, since those are two of the three kinds, can you name the third?"

"Reverend Mother, you know the answer to that better than I." While I had an uncomfortable notion as to what the answer was, I'd a lot rather avoid the question.

She nodded and gestured for me to join her on top of the dune. "This world, Rannarak," she declared, pointing down into the valley beyond the dune, "is a world of the third kind, a doomworld."

In the valley I could see a great collection of crumbling heaps of rubble. It looked more like Ragnarok.

"What's down there?"

"Lumps of metal oxide," she replied, "that were great machines a mil-

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lion years ago. Piles of broken rocks that were buildings where thinking beings performed their equivalents of laughing, crying, and loving, my bishop. A host of other objects, all but obliterated now, are the remains of a civilization that destroyed itself and all its people ages ago. In another million years or so even these pathetic remains will be gone. Except for the radioactivity, there will be nothing to show that these beings ever existed.

"Rannarak," she continued in a more matter-of-fact tone, "is remarkably fresh as doomworlds go; little more than a million years dead. The norm, of course, is *billions*. The statistical likelihood of finding a *live* doomworld is virtually zero, even in a cosmologically young sector of the Galaxy such as this. Thus—"

"Hey, wait a minute!" I protested. "Just because these guys wiped themselves out in a nuclear war is no sign we're going to do the same." And I thought, *Is it?*

There was in her manner the slightest hint that I had just made an incriminating admission. In the same factual tone her transladisk continued, "The mere fact that you instantly understood without explanation how the inhabitants of Rannarak perished is proof that your people are in danger of sharing their fate. As I was saying, since the present situation is utterly unprecedented and unexpected, I am at a loss as to what to do."

"Reverend Mother," I replied, wondering how I was going to get out of what was rapidly becoming deep water, "I fail to understand your confession."

"Surely it is obvious, Bishop Irving. I face a moral problem of great moment and great difficulty. As my confessor, you are obligated to give me any useful advice or information you may possess."

She was asking me to tell her the true condition on Earth! To commit treason by revealing classified information. If I did tell her, the result could be disastrous. If I did not, she might act in ignorance with worse results. I tossed a mental coin. It came down TELL.

I TOLD. When I had done, she thanked me and said I'd best return to the *Kennedy*.

"What," I asked while trying to disguise my nervousness, "are you going to do?"

"The problems of your race come about because you have not yet learned to understand your True Revelation. With the Mother's help I will do what I may to open their eyes."

Back on the *Kennedy* (I really think this place should be called the Space Station *Nixon*. It's not the New Frontier; it's the stage for monumental hypocrisy.) Anyway, back on the station I turned in the slide—there was only one—and kept my mouth shut about everything else. Well, no. Actually I had to invent a cover story. What, Windy Windhorn wanted to know, did Devil have to confess?

"Sinful thoughts," I replied. "She's got the hots for you, Mister Secretary."

The doke actually believed me.

The sheer mechanics of setting up a televised conference between Devil and our world's religious leaders kept me busy as an Iranian press secretary. Of course I had all the Earthside help I

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wanted, but all my fellow Astronauts and Cosmonauts were busy making arrangements to load the workers onto the Star Train. While you might not care to leave Earth for a thousand years, I'm told there were over eighteen million volunteers in the first hour.

I'll bet Sonya was one of them. That maddening—and Zen-blasted desirable—woman volunteers for absolutely everything.

I was three hours from curtain time and at a complete loss as to how I could set the thing up when the call came from Earth. It was Langley, of the photo interpretation section.

"Cousin Irving," a total stranger told me (gosh but it's good still to be part of the family), "we've been checking this new slide and—"

"And you found," I finished for him, "that it was exactly the same as the background slide she used before."

"Not quite. In this one all those people are being baptised in a liquid other than water."

"Well then, Cousin Somebody, what is it?"

"We were hoping you could tell us, Cousin Irving. It is palpably not repeat not wine, or oil, or any of the other liquids we can think of for doing a baptism. In her sermon, though, Mother Uh-er said that baptism must be, ah, done in whatever liquid is 'required by a purpose of true repentance.' Can you guess what that might mean?"

For an uncomfortable moment I suspected that this could be a wickedly important problem. I promised the poor dog that I'd think about it. Then I got back to the immediate problem. (Crisis, crisis. I always forget to use the in-word, crisis.)

If you were repentant, truly sorry for the condition of the world and honestly desiring to change it, then in what liquid other than water would you be baptised?

That I could worry about later. Just now, the problem was that I had one 30-cm-by-40-cm TV screen to use to display all the faces of the thousand religious leaders. Obviously people were going to take very short turns.

Well, that would please the hardshell Baptists, and Church-of-Christers, if no one else. After decades of making themselves unpleasant by teaching that baptism by total immersion was the Only True Way and that virtually all of humankind was therefore damned, they had more recently made a great fuss about the theology of taking turns! Alternating and merging at intersections, etc. It's truly marvelous what some people can find in Ancient Holy Writ.

With half an hour to go I decided that on a purely technical level I wasn't doing well. NBC and CBS were merely threatening my life for the way I was fouling up this major news event. ABC was going so far as to make dark hints about ruining my career in journalism.

Sphere came floating in and for the first time in human history, spoke.

"May I help you?"

There's something distinctly awkward about talking to a machine when you know it overheard you and others plotting to scrap it. "Do you," I asked, "have an ego, an instinct for self-preservation, or any such characteristic of organic beings?"

"That question is not logically phrased and has no meaningful content." Sphere

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spoke without commas or anything beyond minimal inflection. "You need not attempt to rephrase it since it is in a general area of inquiry to which I am not programmed to respond."

That sounded mighty like "none of your business, fellow." Still, there was no reason why I shouldn't take the offered help. Midway through my third sentence in a long explanation of what I needed, the entire room vanished.

If I shut my eyes, I could tell by feeling that everything was still there. What I saw around me, however, was a completely different scene: a great outdoor amphitheater. The people, apparently the religious leaders, all appeared pretty startled to find themselves here.

"Brothers and Sisters in The Ground of Being," I said, addressing these dolts in the least controversial manner I could think of. "As the State Department told you, this video conference will be held using the more advanced technological facilities of our honored guest, the Reverend Mother Sherthea." That seemed to calm them, and I went on. "Before the Reverend Mother Sherthea arrives, there are a number of procedural matters that we need to straighten out."

Way I figured it, I could get them all into a footless hassle and nobody would notice that I had accidentally started the whole thing twenty minutes early.

One of a group of red-robed prelates was the first to speak. "On behalf of His Holiness the Pope," Cardinal Whocares said, "we demand to know how such a person as you, a man who until recently had been living with a woman *in sin,* can possibly dare call himself the Bishop of Earth?"

While I tried to think of a way to explain that in a manner that would do me some good, other hostile questions poured in and the whole scene dissolved into chaos. As best I could tell, the delegates from the intolerant religions—all of them, really—had come here expecting to be endorsed as the One True Human Faith and were terrified that some other religion would get the nod.

Fortunately before an actual riot could develop—assuming a collection of people present only as optical illusions could riot—Devil entered.

"I have summoned you," she began, "because there are many among you who fail to recognize the Truth that God your Father and my Mother has given to your race. Even worse, there are those who having seen the Truth failed to practice it."

Dead silence. All of a sudden they had found the true Truth: that none of them was leaving this with a whole coat.

As inconspicuously as possible I slipped away from stage center. The illusion that Sphere was generating had boundaries and in the doorway just beyond its edge were John Wareagle and Tatiana Vinogradova. He looked simply worried. She wore a malicious smile.

"Irving, dearest," she whispered, "I've a message for you. Your old girl friend Sonya, the one you're still hung up on?—because you never got to lay her? She says to tell you goodbye. She's leaving on the Star Train."

I knew Tatiana must have arranged this out of pure malice. Rather than give her the satisfaction of watching my reaction, I moved back toward Devil.

For a while my mind was so full of other thoughts that I paid little attention

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to what Devil—I mean Mother Sherthea—was preaching.

I do recall that there was much, much said about the extreme moral importance of sharing and the absolute necessity for baptism by total immersion in "the liquid which is dictated by a purpose of true repentance."

A great many of the delegates were beginning to realize that the hardshell Baptists were getting Devil's endorsement and were leaving in anger. Within Sphere's illusion they seemed simply to be vanishing.

One of the Baptists, apparently a medical doctor, began asking a long set of complex bio-physiological questions. He received equally long, impossible-for-me-to-understand answers from Devil.

Oh well. A little biotechnology, whatever it may be, certainly won't do the human race any harm.

At last he said, "While all this is extremely helpful, it is theory, and we do not have direct confirmation on a human subject."

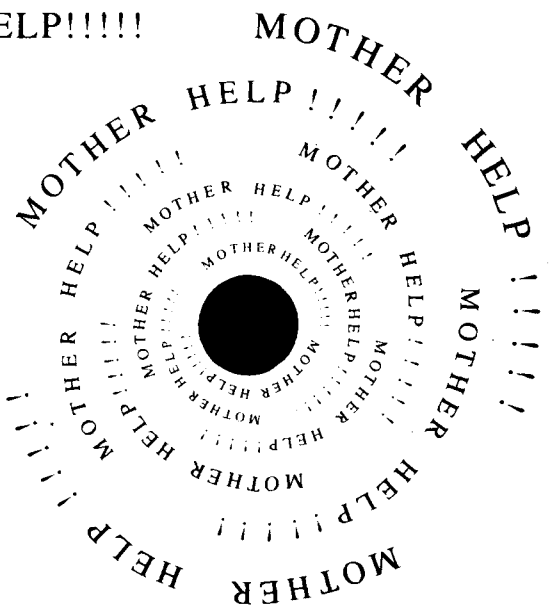
Nodding her agreement Devil said, "Bishop Irving, would you please come here? You have still another Duty to perform."

Abruptly there was an expectant silence. I remember that now. At the time I was preoccupied. "Okay, sure," I casually mumbled.

"I thank you," Devil said in a very grave tone. "It is gracious of you to give your consent so freely to That Which Must Be."

Before I could wake up and ask what was going down, Sphere was moving toward me . . . only it wasn't a sphere any more. It was some kind of monstrous donut. In its center was a churning void of a hole. I remember thinking that Sphere must have looked this way to that poor frog—just before I was sucked into the hole.

MOTHER HELP!!!!!



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15: Post Mortem

The Bad Guys had me. A helpless captive at their mercy. After horrible tortures with a monkey pump they decided to finish me. Since they wanted it to look like natural causes, one of them held my nose while another shoved chocolate-covered thumbtacks down my gullet.

"Now," the leader gloated evilly through his adenoidal breathing, "we'll dump him in an alley, and—"

The roar of an ancient .45 cut him off. Seconds later my captors looked as if they'd been to a St. Valentine's Day party, Chicago style. With nary a bugled *Charge* or a smashing window, my mother had arrived. (That's like "The Marines have landed!" only more violent.)

Unfortunately I had already swallowed.

"Don't worry, Irving Dearest, Mommy Will Fix Everything. You've got those nasty tumthacks in your tumtum because you Forgot What Mommy Said about being Careful What You Eat! Don't Worry, son, Mommy Forgives You. See? I've brought this Advanced Design Cow Magnet. It's not like the old kind that had to stay in the cow till death did them part. This one's hollow with a high field inside so the iron is drawn inside it and then it goes outside my boy by the usual means. Now just Open Wide . . . "

I saw stars.

******

I awoke. I was floating in my own bed area. Hmm, must not have been death after all, I thought, and saw John Wareagle hovering (lurking?) nearby.

"You had us rather worried, Irving, you know. Dev—ahh, Reverend Mother Sherthea assured us that you were none the worse for your experience, but, still, we—or at least I—worried."

I didn't bother to tell him how touched I was. "Where is she?"

"Back on the Train. You've been out for quite a while."

"Did I really, uh . . . like the frog?" Gooseflesh did a little dance on my arms and a couple of ants seemed to be using my spine as a promenade.

Instead of answering directly, Wareagle reached into his pocket and handed me a tiny Star of David. It was seamless, beautiful, shining silver.

"The Reverend Mother wanted you to have this as a memento of what she considers a brave deed on your part."

"Thanks. Nice workmanship, huh! What is it?"

"You—you don't *know?*"

"Sure—it's something to ward off Jewish vampires. What I mean is, what's it made of."

"Oh. It used to be the platinum fillings in your teeth. Since you don't have any cavities any more, it was sort of . . . surplus."

It took me a moment to digest that one. My tongue wandered around automatically, confirming my sudden and quite impossible lack of cavities. Apparently Sphere, like many a human tinkerer, just couldn't take something apart and put it back together again without making a few improvements. I didn't even have anybody to be grateful to! Too bad we couldn't still use

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$37,000-an-ounce gold, rather than this cheap platinum. Still, it was handsome. And my teeth felt just lovely.

I put my tongue to better use. "Well, anyway," I said with a shrug to show how wonderfully brave I am, "it's over and no great harm's been done. Matter of fact I feel as if I've just popped a pre-exam energy pill. Now, darling solicitous John. You're here because you were afraid Devil would lay some religious message on us that would disrupt human culture, but . . . "

I paused to look at John more closely. The I TOLD YOU SO was printed in big type all across his leathery old face. "Wait," I objected. "Before I went out . . . died? . . . Mother Devil had all but given her endorsement to the hardshell Baptists, a nowhere group that couldn't . . . "

He shook his head. "That's what they *were*, Irving. Now they're the New Faithful, and they're sweeping the world like Islam on Holy War. The bureaucrats in Washington and Moscow can't figure out what to do so their official position is that it's just a fad and there's no need to do anything."

Except keep their heads firmly buried in the sand their careers rest on, I thought, but didn't say anything. Wareagle was still talking:

"Of course if they did have the wit to realize that they ought to suppress Mother Devil's new religion, it wouldn't make any difference 'cause it's already too late. The Pope converted an hour ago."

"The *What?*"

"The Pope. *Il Papa*. The Keeper of the Keys."

"Thanks," I said aridly. "John: What Are You TALKING ABOUT?"

"Why Oiving," he said cheerfully, "I thought they taught history at Harvahd! Since you must have missed out, I'll explain. Before Muhammad or Mohammed, Arabic society had no place for most of the too many infants that dared be born female, so they put them out to die of exposure. Of course that kind of practice yielded a bounty of guilt and anger. But nobody did anything about it because nobody knew what else to do. Ah! Now Enter the Prophet! He preached a religion that absolutely forbade infanticide and meanwhile endorsed polygamy—a balanced approach don't you see. And that filled their needs. So, it struck the world like a bolt of moral lightning—"

"What in Buddha's belly," I loudly demanded, "does all this ancient history have to do with the price of eggs in Vatican City?"

"Didn't you ever hear the old saying, 'Those who do not remember history are doomed to repeat it'? Our world, like pre-Muhammad Arabic society, has several moral problems. There are a great many people who, like my Catalina, are—"

"Who?"

"Kathy."

"Oh."

"A great many people, as I was saying, who are bitterly disappointed with the status quo but don't know what to do about it. Enter the Reverend M—"

"Wait, John! Any analogy that casts Devil in the role of Mohammed is absurd! Oh true, she represents a civilization with incredibly advanced technology. But she herself just isn't an

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overly impressive individual. I mean, she's not dumb, but she's not all that bright, either."

Wareagle's vigorous headshaking flapped his long black locks. "A mistake, Irving. You underestimate her. True enough, she does not possess supernormal intelligence. But that's as irrelevant as the fact that she doesn't possess abnormal strength. What counts is that she represents the moral experience of millions of races over billions of years. She has the superhuman—and incredibly dangerous—ability to look at *any* situation and *know what is morally right.*"

I started to say something sharply angry and didn't. I had a flash: Devil, standing above the ruins of the doomworld Rannarak with her bright eyes looking at me and . . . *Seeing.*

"All right," I said slowly. "Granting that the world has some problems and that Devil—the Reverend Mother Sherthea of the Church of All Intelligence — *sic* — is quite capable of suggesting some radically new solution . . . then tell me, just what is this Deadly New Idea?"

"Simply this," John said, and I noted how deadly serious he was. "She and her followers are preaching that the repentance of sins requires baptism, a—"

"I already know that, dammit!"

"—a baptism that is *literally* death and rebirth."

For a long silent moment and more I tried to assimilate the very heavy idea that John Wareagle had just dropped on me.

I croaked, "I went into Sphere and was taken apart and . . . "

He was nodding. "You were dead, Irving. You're reborn. Without cavities, too." But he didn't smile.

I sounded a low whistle that might have been louder if my mouth hadn't been imitating the Gobi Desert.

"John . . . it appears that you are entitled to a large I-told-you-so comma White-eyes. You're the one who predicted a disaster. How are our friends taking it?"

He shrugged. "Pretty well. Of course Kathy's overjoyed, getting her family back and all. Windy thinks it's just a fad. The others are hoping the idiot is at least partially right—that when all the dust settles, things won't really be all that different. As for my being right," he slowly shook his head. "No, it seems I was dead wrong. Instead of a disaster, our planet is getting a dose of unpleasant but overdue and badly needed medicine."

After John's solemn departure I was left alone with my rather viscous thoughts. I think I'd rather have had a liter of red-eye.

A new religion had got under weigh on the Earth. One that would drastically change the way people lived. (Why, this one wouldn't even pick on Jews!) While there'd be occasional riots and such like, the New Religion would sweep all before it with the well-known power of an Idea Whose Time Has Come. The best historic comparison I could think of was the time Perry sailed the U.S. Pacific Fleet into Tokyo Bay. Before the good Commodore gave Nipponese culture an ice-water shower, they had been fiercely determined to protect their medieval ways from modern ideas. Afterwards they westernized at furious speed,

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scrapping much of their ancient culture in the process. The Shogun was beheaded, his class destroyed, and the Emperor, previously a trivial figurehead, rose to supreme authority.

Now there was a charming thought! If the analogy held, the president and all the world's leaders (with the obvious exception of Carlton Sinclair) were going down the tubes and the Secretary General of the UN would be taking over. Or maybe the Pope? Billy Graham, Jr? However it went, incredibly important things were happening. Or rather, things were happening that would be incredibly important under any normal circumstance—which the present situation absolutely wasn't.

The First Contact, the no-limit poker game that would determine the position of the human race in the Galaxy, was still in progress. Right now Devil's devilish new religion was significant only to the extent that it might influence the outcome of the greater problem.

On balance, it would probably help me a little. Yeah, me. That's who it's up to.

No! It helped a lot, I realized.

It was now absolutely clear that Kathy-uh-Catalina Myers (?) was wrong. Earth *could* manage on its own resources. The problem was one old John had talked so much about: pride. How did we prevent the greatness of the Galactic Railroad and what it represented from ruining humankind's sense of self-worth?

How did we enter their universe not as twelfth-class citizens but as proud equals?

Ever come across the ghastly tremendous percentage of American "Indians" who are alcoholics?

They are one people, a few tribes. We are talking about a planet and what's more we're talking about *my* planet. *The* world. The deal we First Contacters made would set precedent; go a long way toward settling the matter. If (big IF!) my plan worked, we'd catch Angel and be able to squeeze him. That should go a long way toward maintaining human pride . . . provided Angel notices what I've done, and provided I can force him to give our world something valuable. Something truly valuable.

Problem is, I don't know what that might be.

He offers me twenty-four dollars in colored beads and, if I say no, he raises it to forty-eight. Whoopee. No. I have to reject all baubles bangles and beads and demand something precious by the standards of the Galaxy.

What?

How do I do it? How does an Indian know that the right way to sell Manhattan Island is for twenty-four dollars U.S. Taxable and several billion in his Swiss bank account? A perpetual payment treaty wouldn't do—those treaties didn't last much longer than a new car guarantee did, back in the days when they made new cars.

Zen blast it all! What am I going to do with a world on my shoulders? I'm Irving Quinan, punk kid fresh out of college, and I borrowed these shoulders from Woody Allen. But I *have* to. The alternative is to trust Windy et al. Sweet Buddha, what I wouldn't give to have my mother up here!

Well if wishes were Cadillacs . . . but they aren't and I have to give it my best

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shot. I've observed Angel for many days and I *think* I have a shrewd idea what he'd be most reluctant to give me. I'll ask for that.

16: Star Train Leaving: All Aboard!

The Train, loaded with two hundred eighty-eight humans, was slowly drifting away from *Kennedy*. According to my agreement with (Fallen) Angel, three human traders will depart on the next Train and return with whatever they are able to buy in three hundred, five hundred, and two thousand years, respectively. Choosing that trio of highly important individuals will be handled rather differently from the picking of the workers! I'm glad I will have nothing to do with it.

In addition, in a thousand years objective time—make that objective *Earth*-time—the workers will return, ten years and a few months older in equally objective Travelers' Time . . . bearing with them whatever a Trainload of spies can steal.

While Windhorn and others remonstrated with me for not having laid a few more facts on Angel, he began maneuvering to get the Star Train back on the light rails. Then it was too late for me to tell what they wanted me to tell. Of the reconnoitering expedition, the trading, the planting of bugs. Demonstrations of Earthly (venal) cleverness and chicanery.

The Train's ion rockets glowed and they slowly fell away from us.

As we watched them depart, Shchurin said, "I expect, Irving, that you'll be on the next Train. You're the obvious first choice for Earth's Spacefaring Trader and . . . in a way we'll miss you."

"Actually," I told him, "I have another job in mind."

Before he could ask me to explain, I pointed. Ion rockets glowing in full blast, the Train was rushing back to us.

Angel must have set an autopilot, for I swear that before the Train had come to a halt (or what passes for a halt in space) he was outside in his space armor. He leaped to *Kennedy*, and we exchanged looks at the sound of his frantic banging on the outer lock door. I smiled.

"You . . . expected this?" Stiva Shchurin said.

"I thought Angel couldn't possibly be a fool," I said.

"But what's this about another job?" John asked.

"Well," I said, watching Angel come plowing through the inner lock door, "there's this nice interesting post I've had my eye on. . . ."

"What? You have another offer?"

"Not just yet," I said, and stood there trying to look at once sweet and innocent *and* stolid and heroic as Prince Valiant *and* brilliant as Niccolo Machiavelli, while Angel doffed his helm and made for me. He ignored all others and else. His blue eyes were shot through with red in an interesting marbling and his entire body was squirming.

"That jewel you gave the Reverend Mother—"

"Yes. As I said, it is a very rare gem on Earth."

"But there are no such stones on your world!"

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I spread my arms, palms up. "What could be rarer than that?"

"There were many such stones among the passengers on my third car! And now my mass indicators show all cars normal except Three, which is five hundred kilos lighter than it should be!"

I gazed straight into those unearthly eyes. "Naturally, my dear fellow. There wasn't anything we wanted on the other cars."

Angel made a visible effort to calm himself, while I watched. The result was that he slid down the scale to a mere twitching rather than squirming. Admirable.

Beat these four aces and a joker, I mused, *you big blue-eyed bastard! Thought I was running a bluff, didn't you!*

"So, little Priestling. You are much more than you seem. In fact . . . you may well be the Being the Railroad needs; the agent."

"Son," John Wareagle said, and Windhorn finished it: "of a bitch!"

I thought such language a bit strong for my mother, in view of what she'd just done. Still . . .

But Angel, unable to outwait my bland look and total silence, was talking on. Nice voice his translator gave him, in English; sounded like Vincent Price.

"I have no time to haggle, Trader," he said, and I was aware that I'd been awarded a title of great respect. "In return for your services as agent for a certain client of the Railroad, we will give an Earth trader a full Grand Tour."

"Indeed. My services?"

He waved those hands with the doubly-opposed thumbs. "Services! Yes! With danger, and need for chicanery and deviousness."

I smiled gently. "I forget my manners. Please sit down, Trader. Let me offer you some refreshments."

"There is not time! The Train must go! We must be in exact position at the right time in order to board the light rails! Failure to maintain schedule is *disaster!"* He was near convulsions. Just that last sentence probably rated three exclamation points.

"My son," dear serene Irving Bishop Quinan said, "you seem to be in haste. The Church of All Intelligence teaches serenity." I gave him a serene beam, brows arched.

For several moments Angel's disk was silent, although his stomach howled like a wolf. Then, explosively:

"It violates Railroad Policy, but in this emergency I can make an exception. I can program the Sphere to obey commands in your language and leave it here. Your people would immediately gain the technical secrets of the Galaxy! I swear by my eggs that there is nothing greater I can offer."

Windhorn gave a whoop, forgot himself and started to cavort, and shot past me at about a half g and accelerating. He hit the bulkhead crownfirst with a tasteless *glong,* rebounded, and floated limply. Shchurin caught a leg as it went by and several of my Earthly fellows bent over the Secretary of State. Thus none of them noticed my reply to Trader Angel:

"Ah, my son! I am sorry, but my people are not sufficiently wise. Such a gift might do them more harm than good. My son."

Angel waved his arms. "But that is

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madness! Your world is critically overpopulated and running out of vital resources! Such a gift is an offer of Life itself to your people and you cannot refuse!"

"No, my son. You are much overwrought and commit an inadvertent heresy. Life is solely the gift of God and it is Her (His) Will that we grow by overcoming these problems by our own efforts. The population-resources problem is readily solved by proper baptism with liquid nitrogen. Thanks to the Reverend Mother Sherthea's teachings we recognize that a purpose of true repentance must be a willingness to remove the sins, solve the problems, which plague our world. Such purpose requires us to take turns living and being frozen. For this moral insight and for some improvements in the technology of baptism—which eliminate occasional tragedies—we are greatly indebted to the Reverend Mother.

"Prior to the Revelation she gave us, we practiced baptism in a sinful manner perilous to our souls. Sparing the rich and powerful, we forced the poor and helpless to migrate to the future via baptism. They, of course, feared the worst. Their fear combined with our guilt to poison our world. No one saw hope for tomorrow because tomorrow was an evil place we forced others to go to.

"Now, however, we have turned from our sins. We share what must be fairly and we can see the future without guilt and without the fear that guilt brings. Migrating into tomorrow is no longer a hardship, for we have a confident hope that tomorrow will be better."

"But what then?" Angel demanded, his arms writhing like a pair of cobras in heat. "What you are telling me is that although the Railroad has desperate need of your services, there is nothing you and your people need from us!"

Right, I thought smiling inwardly, *now baby you get the idea! You are about to get an overdue dose of your own medicine.* Apparently Angel had heard what he'd just said and for sure he was going into fibrillation—assuming he had the wherewithal to fibrillate.

"We have a custom," I said mercifully. "When one is in need and cannot pay, one says . . . Please."

The Star Trader's hands became steady. "Other races have similar customs, Trader Quinan. It is *absolute* Railroad Policy that I may not practice such a custom; for if I did, your race would forever after have the right to say Please to the Railroad."

"Chief?" I said quietly.

"I heard," Wareagle said. He alone was not concerned with the Right Honorable Windhorn, Horace. Secretaries of State—indeed, sovereign states—were a quarter the dozen. We were only talking about the future of an entire planet; the entire race called human.

Maintaining my brows-arched mien of serenity, I returned the most unserene stare of Star Trader Angel. The silence was total and I knew that whichever of us spoke first was the loser.

About the time I began to wonder if I'd perhaps pushed him too far, he spoke, in a bleating blurt: "But you cannot understand how great the thing you ask is! Ultimately such a commitment would mean Earth's becoming a CITIZEN planet!"

"A small price," I replied in utter

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serenity while my heart trip-hammered at the astonishing, marvelous news, "considering that I am the only whatever-it-is-you-need in the entire galaxy."

After only an instant's hesitation, Angel bleated, "Priestling . . . Bishop Trader: *please* come with me!"

"Gladly," I made calm reply, "my son."

"Then hurry!" Angel yelled. "You have to don your pressure s—"

Slipping off my spanking new clerical robes, I showed Angel that I was already pressure-suited. While I began getting on the helmet and gloves, Angel's disk's voice came through via the suit radio:

"This is good, very good. But you'll need food, Trader! It will take two days—your days—for our on-board food synthesizers to adjust to your needs."

"No problem," I said, reaching for the big cannister set near to hand. It had oh-so-recently been the property of Tatiana Vinogradova. It no longer contained a bomb: "I told my mother back on Earth that I might be going on a trip, and she sent a large picnic lunch." ■

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brass tacks

Dear Mr. Schmidt:

After being a reader of *Analog* for approximately 10 years, I have finally felt prompted to write my first letter to the editor. I have just finished reading "The Eternal Juice Machine" by Dean McLaughlin in the February *Analog*. What really made me sit up and take notice was the reference on page 120 to the Cutty Sark, "on the banks of the Clyde, in downtown Edinburgh."

I should explain here that I am a native of Glasgow, where I spent the first 23 years of my life. Many things have changed in Scotland since I left, 16 years ago, most of which I have felt that I would be able to deal with on a return visit. However, I was greatly dismayed to learn that the citizens of Edinburgh, with whom the citizens of Glasgow have long maintained a "friendly" (?) rivalry, have now somehow managed to divert the River Clyde to flow through their city. For all the years I was growing up in Scotland, and for many years before that, I am led to believe, the River Clyde flowed through the city of Glasgow, while the River Forth flowed through Edinburgh. The news that the Clyde, the first sight of which can bring tears to the eyes of a returning Glaswegian, is now in Edinburgh, is a change of such magnitude that obviously my family and friends back in Scotland have been unable to bring themselves to tell me. However, thanks to Mr. McLaughlin, the dire secret is now out. (With a name like McLaughlin, surely he must have Scottish ancestry!) However, please tell him that apart from his error in geography, I enjoyed the story.

ISOBEL HUBBARD
Winter Haven, FL

Consider it done. Furthermore, we were so touched by your concern that

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Dean and I have personally put the Clyde back where it belongs.

Dear Mr. Schmidt,

I have just read with interest your article, "Scientific Research Made Easy" by Robert E. Skinner—March 1, 1982 *Analog*—which details the advent of computerized literature searching and what it means to scientific researchers.

As a professional librarian and an information consultant doing research in all subject areas in this country and abroad, I would like to make a few observations. First, it is my experience in doing computerized searching for over five years, both as a consultant and as a researcher for universities and the Air Force, that few if any searches can be done for the prices quoted in the article. Skinner stated that "it is hard to spend more than $10 or $20 in most cases." What Skinner says is true provided that the searcher is skilled, that the strategy has been well thought out, and that a minimum number of citations (five to ten) are requested either in an on- or off-line format. For those entering a new subject area or those wishing a comprehensive overview, there is no way in which a search could fall into the stated price range. It is my experience that even the most clear-cut search will cost at least $35 of on-line charges. This would mean that little or nothing was retrievable and that no off-line prints were ordered.

Except for quick "dips" into a data base for verification of a citation, most searches require the use of more than one data base, the use of multiple key words, and extended amounts of time for planning and executing strategies. Not only does this add to computer costs, but it also involves telephone hook-up fees.

I would also like to mention that computerized literature searching is not as easy as it would first appear. One reason for this is that the different data base vendors each have their own strategies and formats and their own very unique methods of operation. In addition, data bases within these systems also have their own unique controlled vocabularies, their own special features, and their own tailored formats.

Many find that only by doing extensive searches over long periods of time can they work successfully with this new research tool. Even those undergoing training programs find that unless they keep their skills up-to-date they quickly lose their expertise and fall behind in the ever-changing field.

Thus, more and more researchers are turning to professional "information specialists" to perform such tasks. What they are finding is that those working in the field on a regular basis can not only do a better job, but they can do it quicker and more cost-effectively.

Thank you for giving this topic the coverage it deserves. I would hope that both professional and non-professional writers, researchers, and educators would explore this exciting new development in information retrieval.

EDITH F. ANDERSON
Library Consultant
Del Mar, CA

The author replies . . . Ms. Anderson makes a lot of good points in her letter, but I might suggest that she read the article more closely to find that I did address most of the issues that she brings up. I never suggested that learning to search by computer was a simplistic process. On page 51, I stressed the importance and desirability of receiving training from a system vendor, and of reading the monthly bulletins that are sent to users. On page 46, I pointed

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out that a searcher must consult the thesaurus of the database in use when he is structuring his search. The average *Analog* reader, I'm sure, is intelligent enough to realize that online searching isn't like playing a computer game. It is a sophisticated research tool that has been developed over a long time by a diverse group of intelligent people (see pages 42 through 46). This paper was never meant to be anymore than an overview of online searching, not the last word on how-to-do-it.

It should go without saying (though I will, anyway) that you don't start this type of work today and become a super searcher overnight. Many *Analog* readers already have some knowledge of computers and, I hope, realize that as much knowledge goes into getting information *out* of a computer as goes into putting it *in* there in the first place.

Concerning costs, Ms. Anderson is quite correct when she alludes to the fact that you can spend a young fortune very quickly if you are reckless enough to try to do more than you are really ready to do. A practiced person, or even a greenhorn who is cautious enough to plot out his strategy in advance, can stay within the price ranges I specified on most data bases, however.

As a case in point, I have enclosed an excerpt from a search I recently did on the DIALOG/Excerpta Medica data base. This data base covers all of the material published in the *Excerpta Medica* abstract journals in two files (1975–1979 and 1980–current year) at a rate of $70.00 per connect hour. The search concerns the adverse effects of any steroid used to treat any brain disease, cancer, or injury. For the sake of brevity, I have included only the time and charges from the first file (File 72) followed by the execution of the saved strategy in file 172. (One of the beauties of most of these systems is that you can hand-type your strategy into one file, order the computer to save it, then execute the same search in the next file with a single command.) This particular search utilized nineteen descriptors, some of them numeric, and even with a typo at search statement 8 and one at search statement 19, the search still costs about twelve dollars and a half in each file. That comes to about $25.00 to do a fairly complex, two-file search in an expensive data base. It will be pointed out, I am sure, that I didn't print any of the citations online. In this case I had already done this same search in a cheaper data base (i.e. MEDLINE) and could see that I could trust the strategy and save my client the extra money by simply printing all of the references with their abstracts offline. Ms. Anderson mentions telephone charges as another significant expense, but the TYMNET charge was under one dollar for each file searched.

Concerning doing comprehensive overviews of the literature, that is another story. A comprehensive overview of a subject is seldom necessary unless one is planning to write a review of the literature, a dissertation, or something else in that line. An information specialist or a consultant usually takes it upon himself to advise his client as to what are the available sources in a subject area, and at what point going into all of those sources reaches the point of diminishing returns. The average person looking at the literature in a given area can usually afford to leave a few stones unturned. Multi-data base searches are not for everyone.

If indeed I didn't make myself clear in the article, I will try to head off any rash doings here. *Don't* dive headlong into doing your own searching. It *does*

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take training and it *does* take a certain amount of practice. If, after reading some of the introductory literature available from the companies I listed in the appendix of the article, you feel uncertain about your ability to learn what is necessary, by all means *do* take your research requests to a professional information specialist or broker. Lockheed DIALOG and some individual data base producers maintain lists of brokerage firms and will put you in touch with one in your area. One of the wonderful things about online searching is that you can reap all of the benefits without having to do any of the work.

Good luck to everyone,

ROBERT E. SKINNER

Esteemed Stan:

I noted in one of the recent *Analogi* a quotation supposedly from Martin Van Buren regarding the inadvisability of travelling at the breakneck speed of 40 miles per hour in the newfangled railroads.

Unfortunately, the letter is bogus. I know, since the National Space Institute printed the same quotation last year, like you assuming it bonafide, only to receive a kind letter from George W. Franz of the University of Pennsylvania. He is Editor of the Papers of Martin Van Buren, and ought to know.

But it's the thought that counts. Undoubtedly its goal was to point out that there exists a class of people with the philosophy that if we haven't done it, we weren't meant to. ("It," of course, is a time-dependent variable, but the sentiment has been with us for millennia.)

Unfortunately it is not the good readers of *Analog* who need reminding of this, but the rest of the world. Fortunately, there are people like *Analog* readers and National Space Institute members (which are strongly overlapping sets) out there to remind the others.

Keep up the good work!

MARK R. CHARTRAND, PH.D.
Executive Director

Dear Stan,

Of course I wholeheartedly agree with Ben Bova's guest editorial in the March 1, 1982 issue. And certainly we in the science fiction community have increasing influence as time goes by.

I would like to correct one mistake Ben makes, though: in addition to my friends Frank Herbert and Robert Heinlein, there is at least one other science fiction bestseller; indeed, it was the first SF work to reach #2 on the list, where it stayed for some 15 weeks. That is, of course, *Lucifer's Hammer* by Larry Niven and Jerry Pournelle.

JERRY POURNELLE ■

● The fact is that until extremely recent times, humanity had never heard of ecology...It is a very new science, whose ignorance still exceeds its knowledge by several orders of magnitude. At best, we are bound to make some further spectacular mistakes, before we really understand what we are doing.

Poul Anderson

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a calendar of analog upcoming events

2-6 September
CHICON IV (40th World Science Fiction Convention) at Hyatt Regency Chicago Hotel, Chicago, Ill. Guest of Honor—A. Bertram Chandler; Artist Guest of Honor—Frank Kelly Freas; Fan Guest of Honor—Lee Hoffman. Registration—$15 supporting at all times. Attending—$50 until 15 July, higher at the door. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: Chicon IV, Box A3120, Chicago IL 60690.

11-12 September
VALLEYCON VII (Minnesota SF conference) at Hawaiian Inn, Moorhead, Minn. Local speakers, dealers' room, art show, films. Registration—$4. Info: ValleyCon VII, Box 932, c/o Sanford Steen, Jr., Moorhead MN 56560.

20-24 September
COMPCON Fall '82 (IEEE Computer conference) at Washington, D.C. Info: Compcon Fall 82, Box 639, Silver Spring MD 20901. 301-589-3386.

23-25 September
First IEEE Computer Society International Conference on Computational Medicine and Medical Computer Science at Philadelphia, Penn. Info: Dr. Judith M.S. Prewitt, National Institute of Health, Bldg. 12A, Room 2053, DCRT, Bethesda MD 20205.

24-26 September
URCON IV (Rochester-area SF conference) at Rochester, N.Y. Speakers—Joan Vinge, Hal Clement, Jim Frenkel; movies, dealers' room. Info: URCON IV, Box 6647, Rochester NY 14627.

24-26 September
MOSCON IV (Idaho regional SF conference) at Cavanaugh's Motor Inn, Moscow, Idaho. Guests of Honor—Marion Zimmer Bradley, Wendy Pini; Fan Guest of Honor—Steve Forty. Registration—$12 until 15 September, $15 thereafter. Info: Box 8521, Moscow ID 83843.

25 September
NORTHSTAR, SF seminar, North York Public Library Yorkwoods Area Branch, Toronto, Canada. Guest of Honor—Donald Kingsbury. Admission free. Info: Robert J. Sawyer, 240 Wellesley Street East, #1002, Toronto, Ontario M4X 1G5.

8-11 October
LASTCON TOO (Albany-area SF conference) at Ramada Inn, Albany, N.Y. Guest of Honor—Wilson Tucker; Fan Guest of Honor—Leslie Turek; TM—Lee Killough. Registration—$17 until 22 September, $20 at the door. Info: LASTcon Too, c/o LASTSFA, Box 13-002, Albany NY 12212.

8-11 October
PROJECT STARCAST (multi-media conference) at Harrogate Exhibition Centre, Harrogate, U.K. Registration—£25. Info: Project Starcast, Third Floor, 121 Princess Street, Manchester UK M1 7AG.

—ANTHONY LEWIS

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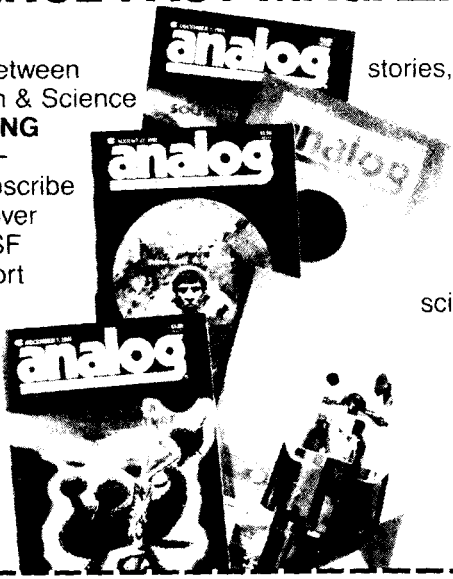

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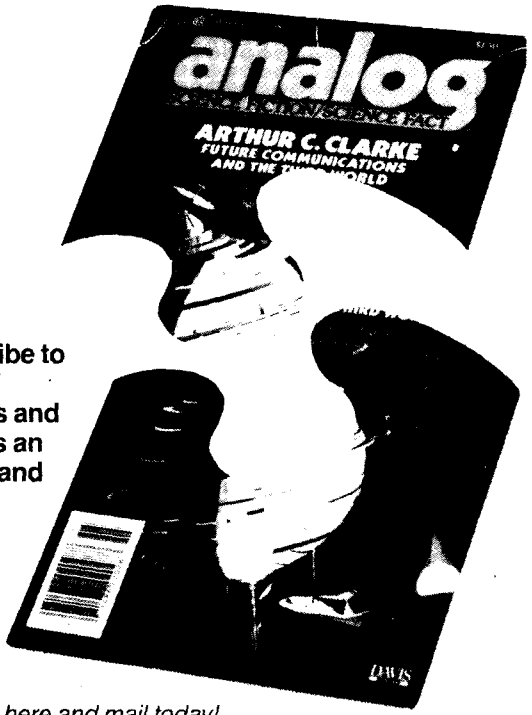

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